THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

MARCH
1953

Floating Plant of Cooley Gravel Co., near Denver, Colo.

in ONE OPERATION with a WILLIAMS HAMMER MILL

WILLIAMS ALSO MAKES

Heavy-duty hammer mills in smaller sizes for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "package" crushing and grinding plants.

Williams Hammer Mills are designed so as to eliminate the necessity of primary and secondary reduction units, to do away with their costly conveyors, drives, foundations, etc., and to crush power shovel loaded stone to commercial sizes *in one operation.* Savings of from 30% to 50% in crushing costs are not uncommon as well as additional savings of 25% to 75% in initial investment.

No matter what your job requires—2″, 1¼″, ¾″ or agricultural limestone—one Williams Heavy Duty Hammer Mill will do the job better, faster and cheaper.

WCS1-6

WILLIAMS PATENT CRUSHER AND PULVERIZER CO.
800 St. Louis Avenue **St. Louis 6, Missouri**

OLDEST AND LARGEST BUILDERS OF HAMMER MILLS IN THE WORLD

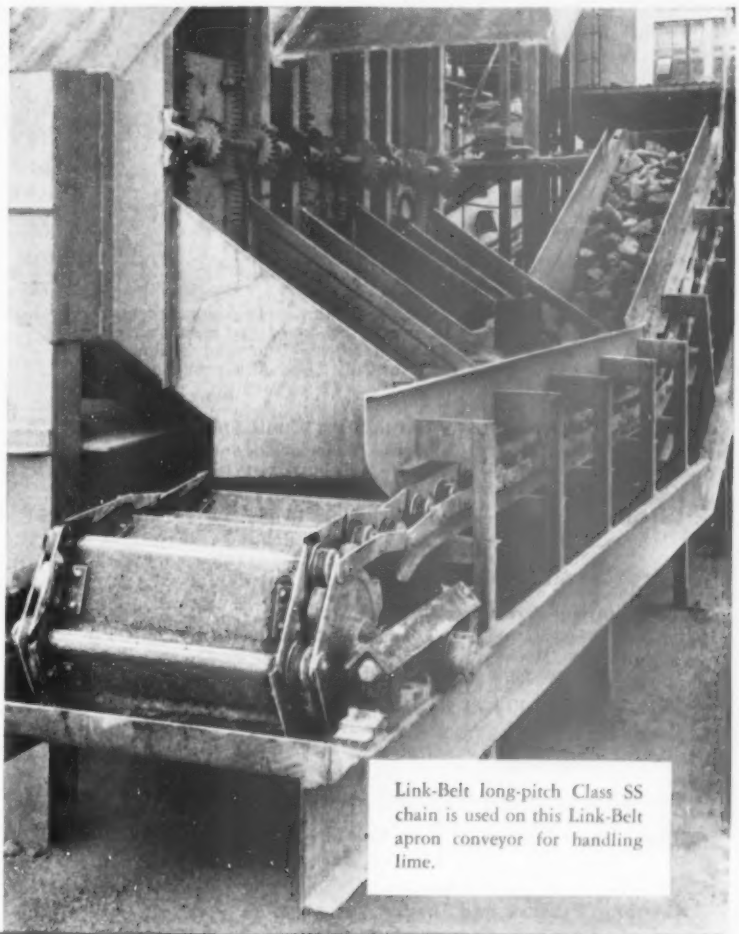
No ONE chain serves every purpose

LINK-BELT offers a SPECIFIC chain ... to match your SPECIALIZED needs

There's just *one* type of chain that *best* meets the requirements of any given job. And no "general purpose" chain can do it as well. From our complete chain line, Link-Belt engineers can recommend the *right* chain for your requirements. There's no necessity to fit your needs to a limited line.

Get longer life!

Remember, too — when you see a chain with the Link-Belt trade-mark, you can be sure it's made to the highest standards. Link-Belt's modern plant facilities assure greater refinements of manufacture. Accurate control of materials and processes give increased uniformity . . . longer chain life.



Link-Belt long-pitch Class SS chain is used on this Link-Belt apron conveyor for handling lime.

TYPICAL CHAINS from the COMPLETE LINK-BELT line

Class SS bushed roller chain with offset sidebars —for heavy drive service at moderate speeds.

Class SS bushed roller chain with straight sidebars —for practically any conveying or elevating service.

Class 800 lev bushed chain—for heavy duty, severely abrasive conveying and elevating.

Class C combination chain—popular, durable, low cost design for elevators, conveyors.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY—Plants: Chicago, Indianapolis, Philadelphia, Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 12,928-B

ROCK PRODUCTS

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Nathan C. Rockwood
Editorial Consultant

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To Subscribers—Date on wrapper indicates issue with which your subscription expires. . . In writing to have address changed, give old as well as new address.

Only B. F. Goodrich makes the grommet belts that cut costs 20 to 50%!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

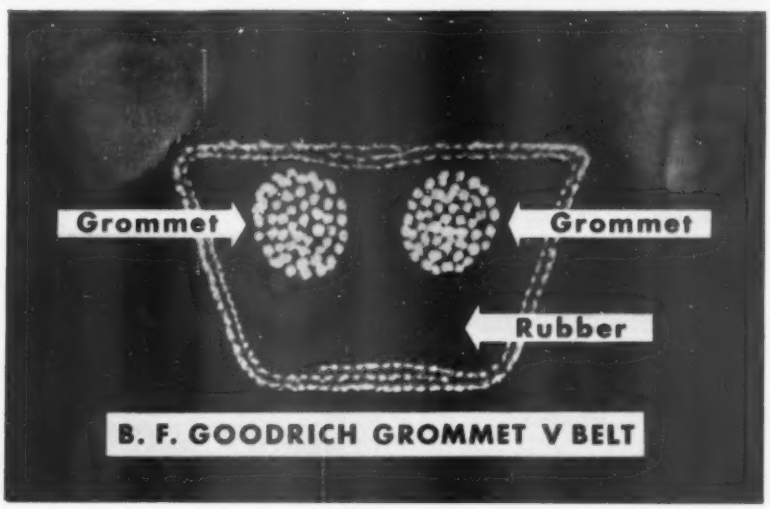
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V-Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. RP-3
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

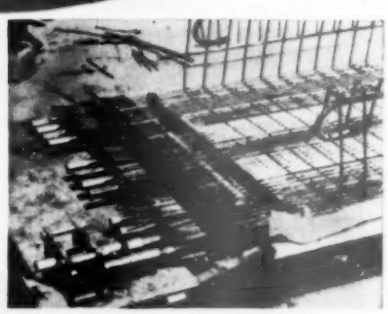
Street Address_____

City_____

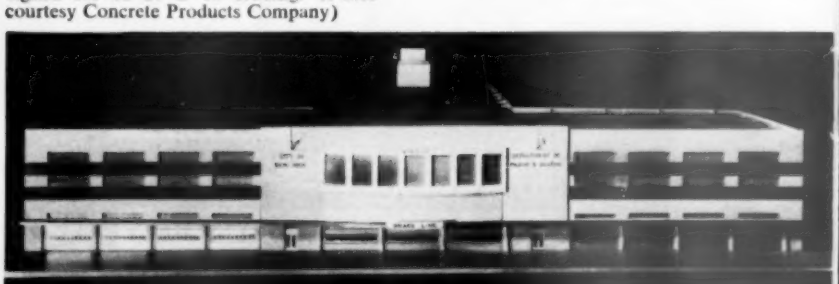
State_____

THIS PRESTRESSED high pressure concrete pipe line was installed at Hammond, Indiana, in 1939. Photograph shows installation of one of the earliest prestressed concrete pipe line installations in the United States. (Photo courtesy Price Brothers)

THIS PHOTOGRAPH shows the first pre-tensioned concrete bridge in the United States, erected in 1950 by Concrete Products Company of America. The Hockersville bridge, located near Hershey, Pa., was erected in 1 hr. 15 min., using American High Strength Reinforcing Strand. The bridge was designed for H 20 S 16 loading. (Photo courtesy Concrete Products Company)



THIS PHOTOGRAPH shows details of jack and anchorage of pre-tensioned wire on the Hockersville bridge. Note American Welded Wire Fabric used for stirrup reinforcement. This was a State Highway Project. (Photo courtesy Concrete Products Company)



MODEL OF PIER 57, New York City, now under construction using novel method of reinforced concrete box construction. Prestressed concrete stringers, incorporating American Super-Tens Wire will support the main deck. (Photo: Freyssinet Company, Inc.)

THESE PICTURES show the wire pattern, forms, and finished prestressed concrete stringers which are being used in the construction of New York's new Pier 57. American Super-Tens High Tensile Wire was prestressed by the Freyssinet Method.

AMERICAN *Super-Tens* WIRE AND STRAND

for Prestressed Concrete

EVER since the idea of prestressed concrete was introduced to the engineers of this country, American Steel and Wire Division has been producing high tensile wire and reinforcing strand for use in experimental and actual construction projects on prestressed concrete. Our long experience with steel wire and our research of this particular application have contributed substantially to the progress of prestressed concrete construction.

Our engineers have accumulated a vast amount of technical data in regard to pre- and post-tensioning problems and methods and the selection of the proper type of wire or reinforcing strand to achieve pre-determined stress requirements.

Our research has resulted in the production of U·S·S American Super-Tens Wire and Reinforcing Strand specifically designed for use in pre- or poststressed concrete. Whether you require high strength, high creep resistance, maximum ductility, good corrosion resistance, good concrete bonding qualities, easy handling or combinations of these qualities, we have or can design and produce the wire or strand you need. Our specially designed wire is being used in the great modern Pier 57 now being erected in New York City.

We welcome your inquiries as to the use of American Super-Tens Wire and Strand in the prestressed concrete applications you have under consideration. At your service, also, is the experience of our engineers to help you determine the proper, yet most economical, type and form of stressing materials to do your job best. Write for technical bulletins describing the properties of American Wire and Strand for Prestressed Concrete.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

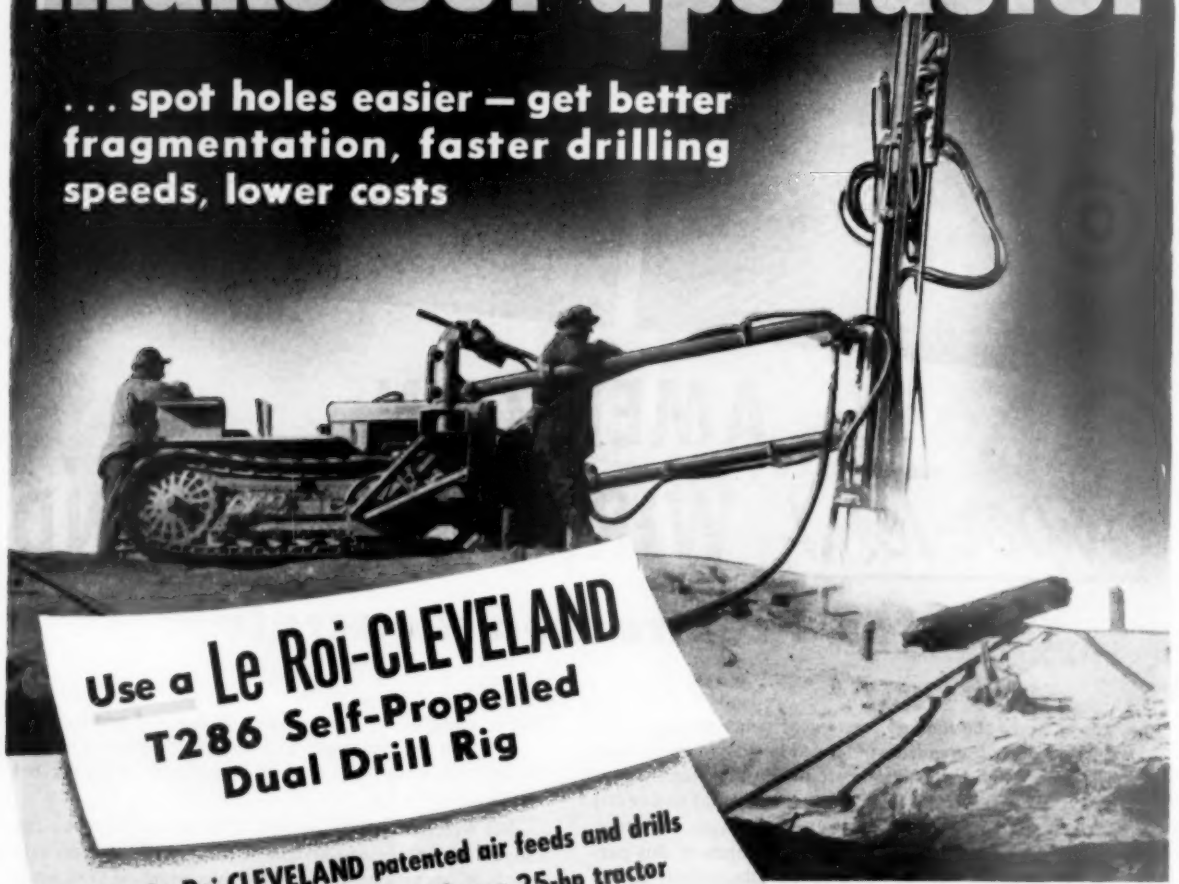
U·S·S AMERICAN *Super-Tens* WIRE *and* REINFORCING STRAND

USS

UNITED STATES STEEL

make set-ups faster

. . . spot holes easier — get better fragmentation, faster drilling speeds, lower costs



Use a Le Roi-CLEVELAND T286 Self-Propelled Dual Drill Rig

It's 2 Le Roi-CLEVELAND patented air feeds and drills with air-motor booms mounted on a 25-hp tractor

3 speeds forward . . . 1 speed reverse

ONE man *drives* the Le Roi-CLEVELAND T286 places you couldn't get to before with a wagon drill. And he tows the compressor right along. The T286 drills and cleans holes as deep as 30' — in any direction — at any angle — with less air. All this means faster set-ups, better hole spacing, greater footage, better fragmentation, lower costs. Have your Le Roi distributor show you. Write for Bulletin RD-21.

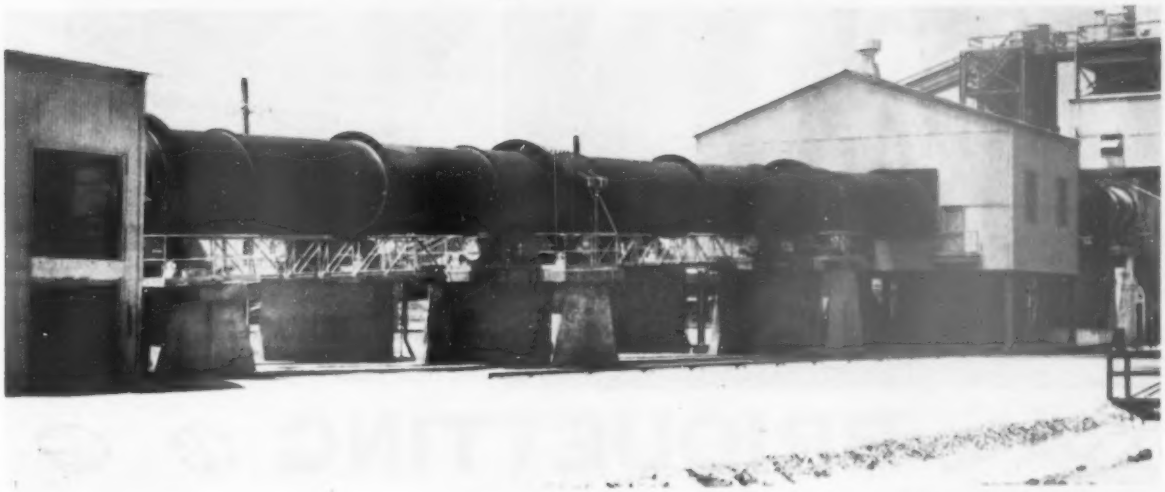
One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need to operate the T286 Dual Drill Rig, when it is equipped with Le Roi-CLEVELAND 4"-bore drifters. A smaller compressor is sufficient, when the T286 is equipped with the 45-lb. H10 or 80-lb. H23 (3⅛"-bore) sinker drills or 3½"-bore D25 drifter.

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION
12500 Berea Road, Cleveland 11, Ohio
Plants: Milwaukee, Cleveland and Greenwich, O.

C-144

Traylor Rotary Kilns
curb expanding maintenance costs

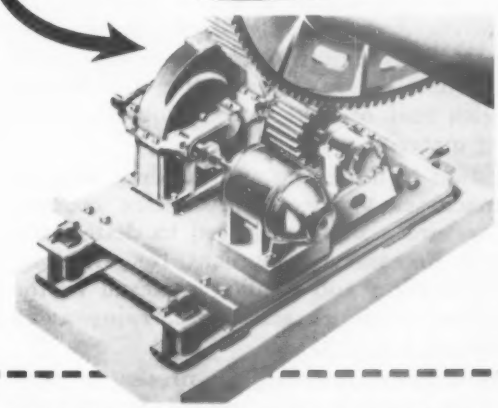


ROTARY KILNS, in the modern Cement Plant, must be able to absorb the punishment of continuous production. Otherwise, frequent repairs and resultant down-time quickly convert profit into loss.

Traylor Rotary Kilns are designed for the modern Cement Plant. Solid cast steel floating riding rings are mounted on machined blocks. This insures a perfect fit as shell expands and contracts. Uneven wear which causes expensive maintenance is eliminated. In a Traylor Kiln, secondary air is utilized to obtain maximum heat efficiency from every B.T.U. This Traylor feature achieves amazing thermo - processing economies.

It is careful attention to design and construction details such as these that have built Traylor's reputation for dependability. For complete information on all the superior features of Traylor Rotary Kilns, send for Bulletin 115 today.

THE TRAYLOR KILN DRIVE
is completely mounted on a sole plate. The plate is fully adjustable as a unit to insure perfect alignment and easy adjustment of main gear and pinion.



TRAYLOR ENGINEERING & MANUFACTURING CO.
555 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York, Chicago, San Francisco
Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P. Q.

A **Traylor** LEADS TO GREATER PROFITS

Send Bulletin 115 giving the advantages of Traylor Rotary Kilns.

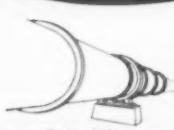
Name: _____

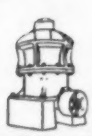
Position: _____

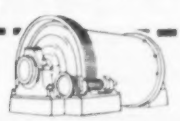
Company: _____

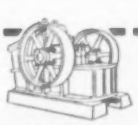
Address: _____ State: _____

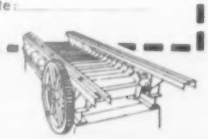
Primary Gyratory Crushers


Rotary Kilns

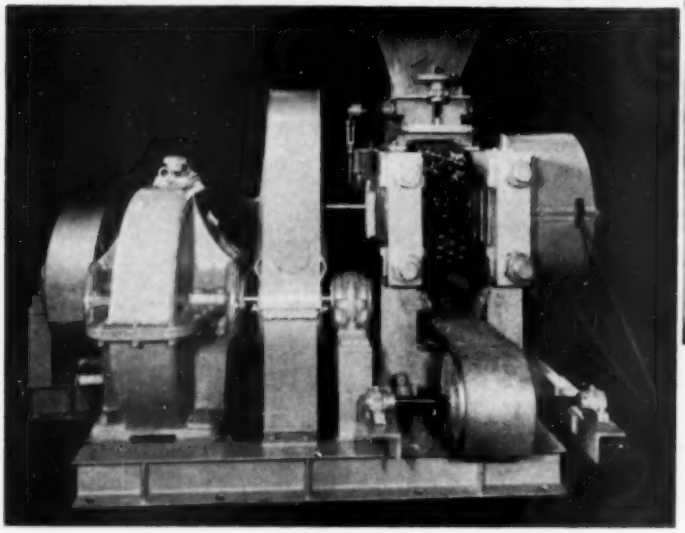

Secondary Gyratory Crushers

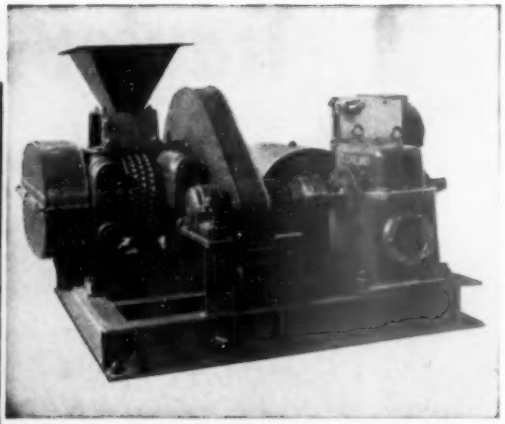

Ball Mills


Jaw Crushers


Apron Feeders

Below: Self-contained unit for briquetting high-carbon ferro-chrome ore. Comprises motor, speed-reducing gears, feeding and discharge mechanisms, in addition to the heat-treated alloy-steel briquetting rolls. Designed especially to meet the purchaser's requirements.





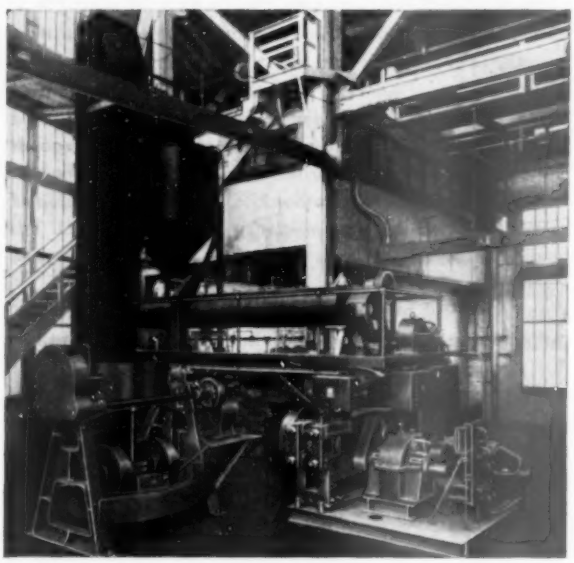
Above: Laboratory briquetting machine equipped with several sets of 12-in. diam. rolls, for making different types of briquets. Designed for use by Vulcan technicians but available to other organizations for experimental work in their own laboratories. Unit, as illustrated, is self-contained; including 5 hp. motor, speed reducer and enclosed gears for driving the briquetting rolls. Other sizes designed and built to order.

BRIQUETTING
MAY BE THE BEST ANSWER TO YOUR PROBLEM

For many years the Vulcan Iron Works has been designing and manufacturing heavy-duty briquetting equipment—thereby helping to solve many problems relating to the beneficiation and successful utilization of materials that were either not usable at all in their original form or could not be utilized efficiently. Materials treated range from chemicals to various types of metalliferous fines—often in combination with coal or coke and various types of binding material.

In addition to designing and building briquetting machines to meet any specific requirement we are equally prepared to design and build all necessary equipment for grinding, mixing, heating and feeding material to the briquetting machines and for carrying away the finished briquets.

Correspondence regarding any present or prospective briquetting requirement is cordially invited and arrangements will be made, if desired, for conducting either laboratory or pilot-plant tests and research.



Pilot briquetting plant in which trial runs can be conducted on a sufficiently extensive scale to determine proper commercial procedure and approximate production cost. Provided with facilities for grinding, mixing and feeding materials to the press.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Rotary Kilns, Coolers and Dryers	Double-Roll Briquetting Machines	Heavy-Duty Electric Hoists	Steam Locomotives
Rotary Retorts, Calciners, Etc.	Open-Hearth Steel Castings	Self-Contained Electric Hoists	Diesel and Gasoline Locomotives
Improved Vertical Lime Kilns	Steel-Plate Fabrication	Scraper-Loading Hoists	Diesel-Electric Locomotives
Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears	Electric Locomotives and Larrys

users specify AMSCO DREDGE PUMPS

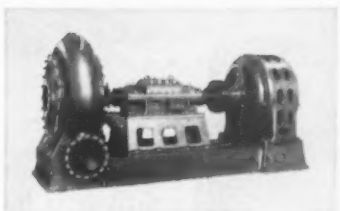
More **Amsco** Pumps have been placed in dredges for sand and gravel recovery, river and harbor dredging, shell reclamation, and more recently, ores such as titanium, than those of any other manufacturer. The reasons for this preference are clear:

Amsco Pumps, with working parts made of manganese steel, can withstand the terrific abrasion of sand and the sledge hammer blows of rock much longer than any others.

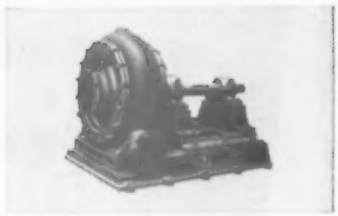
Amsco Pumps are designed from experience and engineered for your job.

▶These six basic types of Amsco Dredge Pumps—actually there are 40 different models—give a general idea of the complete line. The basic differences are in rated capacity, weight and construction of bearings, and in proportionate shaft sizes. Such modifications are made for economy...There is no dollar-wasting excess weight on the Amsco Pump engineered for your job. Water end parts are also available in ABK metal subject to our engineers approval.

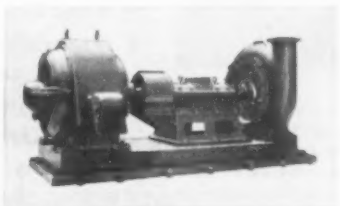
Amsco has a complete line of welding rods and electrodes to assure prolonged life and economical service of Amsco Dredge Pumps.



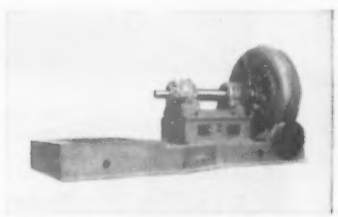
16-inch type XH—directly connected design; right hand bottom discharge. Can be fitted with "standard" or "counter-flow" water ends.



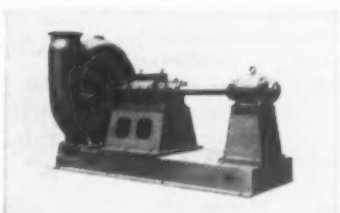
6-inch type SB-CF, form 24—antifriction bearing; stub base or belt driven; right hand bottom discharge.



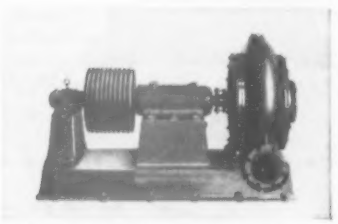
10-inch type M—left hand top discharge. Built in 6-, 8- and 10-inch sizes. Can be fitted with "standard" or "counter-flow" water ends.



20-inch type XHRB-CF—left hand bottom discharge; antifriction thrust and radial bearings.



12-inch type H-CF, form 40—right hand, top vertical discharge; belt driven. Combination two directional-type ball thrust bearing and sleeve-type radial bearings.

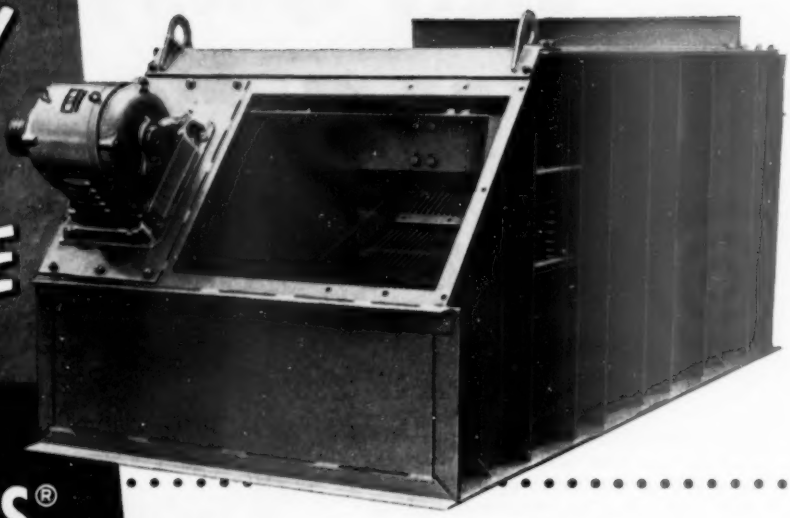


8-inch type C, form 30—belt driven; left hand bottom discharge; combination ball thrust and ring oiling sleeve main bearings. Available with "standard" or "counter-flow" water ends.

Brake Shoe **AMERICAN MANGANESE STEEL DIVISION**
377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

FOR HEAVY DUTY SERVICE



...use the SYMONS® ROD GRIZZLY

The Symons Bar Grizzly is recommended for large tonnage scalping where clear spacings of 1½" and larger are permissible. The powerful vibrating action of the Bar Grizzly makes it particularly effective for wet, sticky or gummy materials. The sloping, curved bars of the Symons Bar Grizzly tend to tumble the material as it passes over the screening surface. The tumbling action effectively assists in separating the undersize.

For full details about the SYMONS ROD GRIZZLY, send for your copy of BULLETIN 207.

THE Symons Type K - RG vibrating Rod Grizzly is built for heavy duty service in handling large tonnages of dry, wet, sticky or gummy ores and rock. Here are some of the important features that have been incorporated into the Symons Rod Grizzly:

- *Heavy duty construction throughout . . . built to handle large tonnages under severe operating conditions.*
- *Abrasion resistant spring steel rod screening surface.*
- *Long lasting, low cost rods are easily adjusted or replaced.*
- *Effective, vigorous vibration provides thorough scalping. Amplitude of vibration can be quickly and easily changed to meet various operating conditions.*

This grizzly is ideally suited for service following most sizes of primary crushers and scalping operations requiring separations at ¾" or larger.

NORDBERG MFG. CO., Milwaukee, Wisconsin

S153

SYMONS . . . A Registered Nordberg Trademark Known Throughout the World

SYMONS GYRATORY CRUSHERS

SYMONS CONE CRUSHERS

MINE HOSTS

SYMONS "V" SCREENS

GRINDING MILLS

DIESEL ENGINES

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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO

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Power in the pit... and plenty of it

On the tip of Long Island, N. Y., the Colonial Sand & Stone Co. uses this Manitowoc Speed Crane to load sand onto a conveyor belt. The 2½-yd. bucket handles 350 yds. an hour, nine hours a day.

Foreman Lawrence Miguez says, "It's an easy machine to operate and it has plenty of power to back it up." It gets that power from a Caterpillar D17000 Diesel Engine.

This 200-HP Diesel engine has the power and the stamina for a tough job like this. Right at sea level, in sand and mud all day, its special Caterpillar oil breather and air cleaner keep dust and grit out, keep that bucket moving without down-time. And the engine can run at top efficiency on low-cost No. 2 furnace oil, too: its single orifice injection valves will not foul or clog even on inexpensive non-premium fuels.

Leading manufacturers of excavating equipment can furnish this same kind of reliable, economical Caterpillar power in the machines they build. It will pay you to *specify* it when you buy. Your Caterpillar Dealer will be glad to demonstrate why. And he's the man to see for service, too, and for those genuine Caterpillar parts which guarantee you the same Caterpillar quality that's built into every one of these Diesel engines and electric sets.

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

Diesel Engines
Electric Sets

NEW! UNION'S NON-

for IMPROVED STACKING, PALLETIZING and MATERIAL HANDLING

ECONOMICAL
The most economical bag with a built-in NON-SKID.

LESS REPROCESSING
Less breakage and spilling means less rehandling of product.

MORE PROTECTION
Curtails breakage due to bags falling from fork trucks and stacks.

PLEASES YOUR CUSTOMERS
Reduces likelihood of transit damage due to load shifts; cuts down complaints.

LABOR SAVINGS
Fewer man-hours needed to clean up contents of broken units; easier handling.

UNIFORM STACKING
No variation. Provides completely dependable stacking qualities.

MOVE FREELY
Manufactured to flow on chutes and conveyors.

WON'T ADHERE
Bags will not stick to each other in bundles.

ADAPTABLE
Special coating is controllable. Like all Multiwalls, it is custom-engineered for each use.

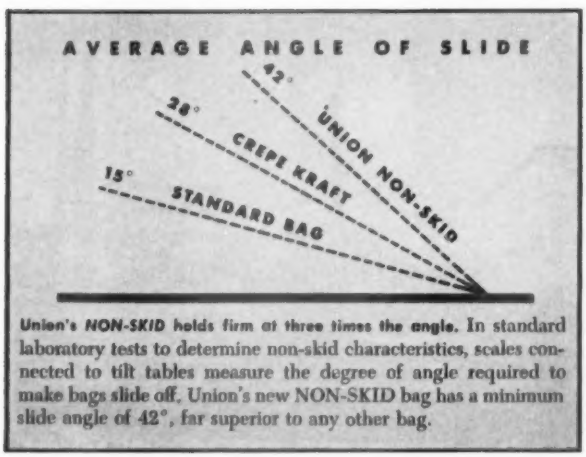
SHIP BETTER
Resist rough handling. Less tendency to slide and chafe in transit.

TRANSPARENT
Coating shows inks and stock to full advantage.

EASY TO SEW
Tops of bags may be kept free of coating.

-SKID MULTIWALL BAGS

Sprayed-on coating reduces skidding effectively



Union's *NON-SKID* holds firm at three times the angle. In standard laboratory tests to determine non-skid characteristics, scales connected to tilt tables measure the degree of angle required to make bags slide off. Union's new NON-SKID bag has a minimum slide angle of 42°, far superior to any other bag.

Union's brand-new
NON-SKID Multiwall Bag
guarantees better performance at
every stage of your
packaging, storage and shipping operations
where skid control is essential.

Union's *NON-SKID* is a
performance-proved Multiwall
with the addition of
an exclusively developed resin-like emulsion.
Almost invisible to the eye,
this new spray makes this the first
all-way NON-SKID Multiwall.

This new bag delivers a far greater *non-skid* rating in every direction . . .
even greater than bags made of creped kraft.

Size — Stock — Delivery

Available in Union Multiwalls of all sizes with either a kraft or bleached outer ply. Initial capacity may be limited. Orders will receive priority in order of receipt. Investigate now.

BEST APPLICATIONS

Union's *NON-SKID* is particularly recommended for feed, chemicals, flour, synthetic rubber, starch, fertilizer, insulating materials, and other products in whose packaging material handling is an important consideration.

DRIVER COULDN'T MAKE *NON-SKID* BAGS SLIP OFF!

In one plant test, a gasoline-powered truck was loaded with these bags. The driver was instructed to make them slip off. He started forward at full speed, then applied brakes full force. Although momentarily the truck itself threatened to tip over, the stack of NON-SKID Multiwalls resting on the forks merely leaned slightly, then settled back to their original position.

UNION BAG
& PAPER CORPORATION
Woolworth Building, New York 7, N. Y.

SEE FOR YOURSELF

UNION BAG & PAPER CORPORATION
Woolworth Bldg., N.Y.C. 7

We would like more information on the new Union NON-SKID Multiwall Bag.

Name_____ Title_____

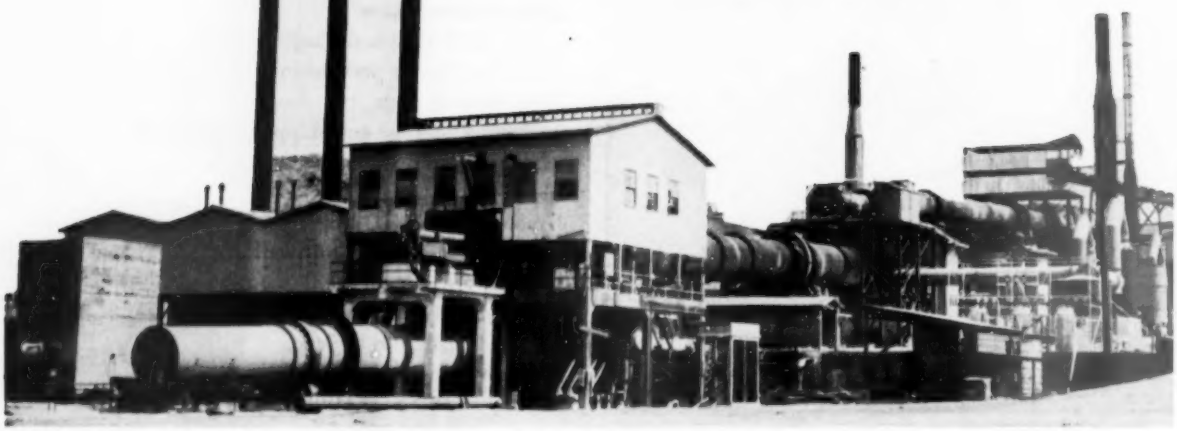
Company_____

Street_____

City_____ Zone____ State_____

RP353

ROTARY KILNS-
COOLERS-
CALCINERS-
DRYERS-
ANYWHERE-
ANY SIZE!



IT PAYS TO STANDARD-IZE

Here is another proof of STANDARD'S ability to design and fabricate rotary equipment for *any* job, large or small. Photograph shows a STANDARD kiln and cooler "in line" handling low grade manganese ore for the new *Lord process at Manganese, Inc., Henderson, Nevada. A 10 foot diameter STANDARD kiln (center) receives flotation concentrate of the manganeses dioxide ore and nodulizes it at 2000° F. The nodules then pass to a STANDARD cooler (lower left) where they are cooled to about 500° F.

STANDARD precision engineering based on more than 50 years experience stands ready to solve your problems, too — ANYWHERE in the world. Find out why in ROTARY EQUIPMENT "It pays to STANDARD-IZE". Write *today* for *Standard Bulletin* 524.

*Southwestern Engineering Company, Los Angeles, engineered this plant to incorporate a new concentrating process which is an exclusive development by Robert Lord, SWECO's Chief Metallurgist.

STANDARD 50 YEARS 1902 1952 STEEL CORPORATION

STANDARD

STANDARD STEEL CORPORATION

5036 Boyle Ave., Los Angeles 58 ★ 7 East 42nd St., New York 36

This 'Dozer *Pays* its way

A D2 Tractor with Cat No. 2S Bulldozer stockpiles shot sand at Cowell, Calif. Also shown is Mr. Charles Laws, the owner.

ANY Caterpillar Bulldozer will keep busy and more than earn its keep on a sand-pit or quarry operation. This D2-No. 2S 'Dozer, owned by Charles Laws, of Concord, California, is no exception.

Smallest bulldozer unit in the Caterpillar line, the D2-No. 2S is built with the same rugged strength and powered by the same type of dependable Caterpillar Engine as its big brothers. That's why Mr. Laws bought it. He had had experience with Caterpillar track-type Tractors on a logging show and knew what they could do.

This particular unit is used for stockpiling shot sand and stripping light overburden. But the D2 'Dozer is an excellent tool for other jobs, such as feeding the loader and building access roads. It's a quick, sure-footed machine, easy to handle. And because it uses low-cost No. 2 furnace fuel without fouling, and stays on the job without tinkering, its operating economy is outstanding.

Your Caterpillar Dealer has a complete line of sturdy Cat Bulldozers, matched to all tractor sizes. He'll be glad to demonstrate the unit you need. And he'll back its long work life with reliable service and genuine Caterpillar parts. See him now.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

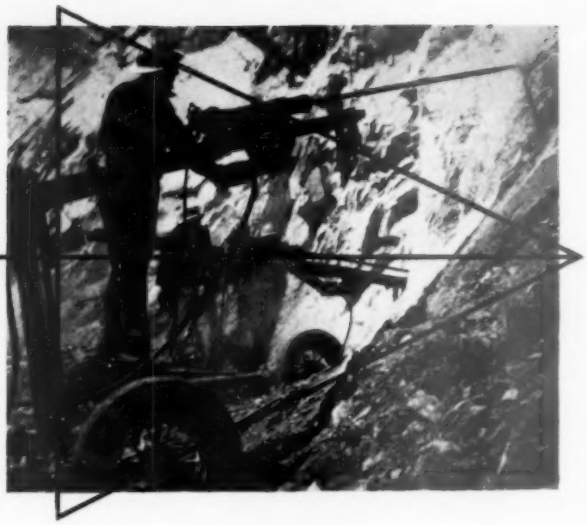
CATERPILLAR, PEORIA, ILLINOIS

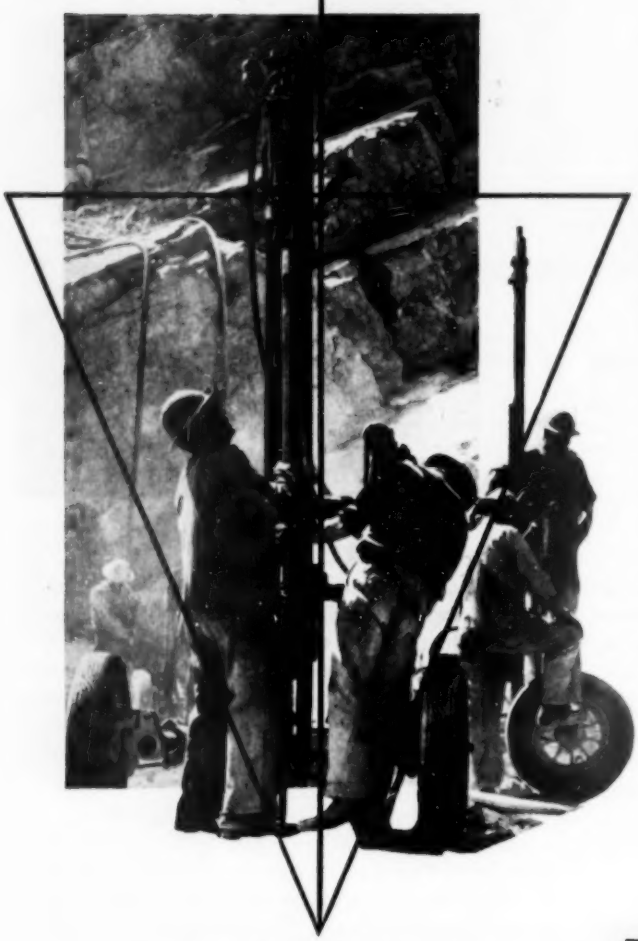
for faster drilling—

vertically

horizontally

at any angle





The G-300 WAGON DRILL drills rapidly, easily, efficiently on any location — being designed to utilize to full advantage the high drilling speed and strong rotation of the CP 4-inch 70-N Drifter.

Tubular chassis and drill carriage provide rigidity and strength without undue weight. Controls are conveniently centralized. Specially designed feed motor and cone-gear drive give great load-carrying capacity. Has heavy-duty centralizer. H-member drill support assures stability, minimizes vibration.

Wheels can be turned at right angles to facilitate line drilling or drilling close to a ledge or wall.

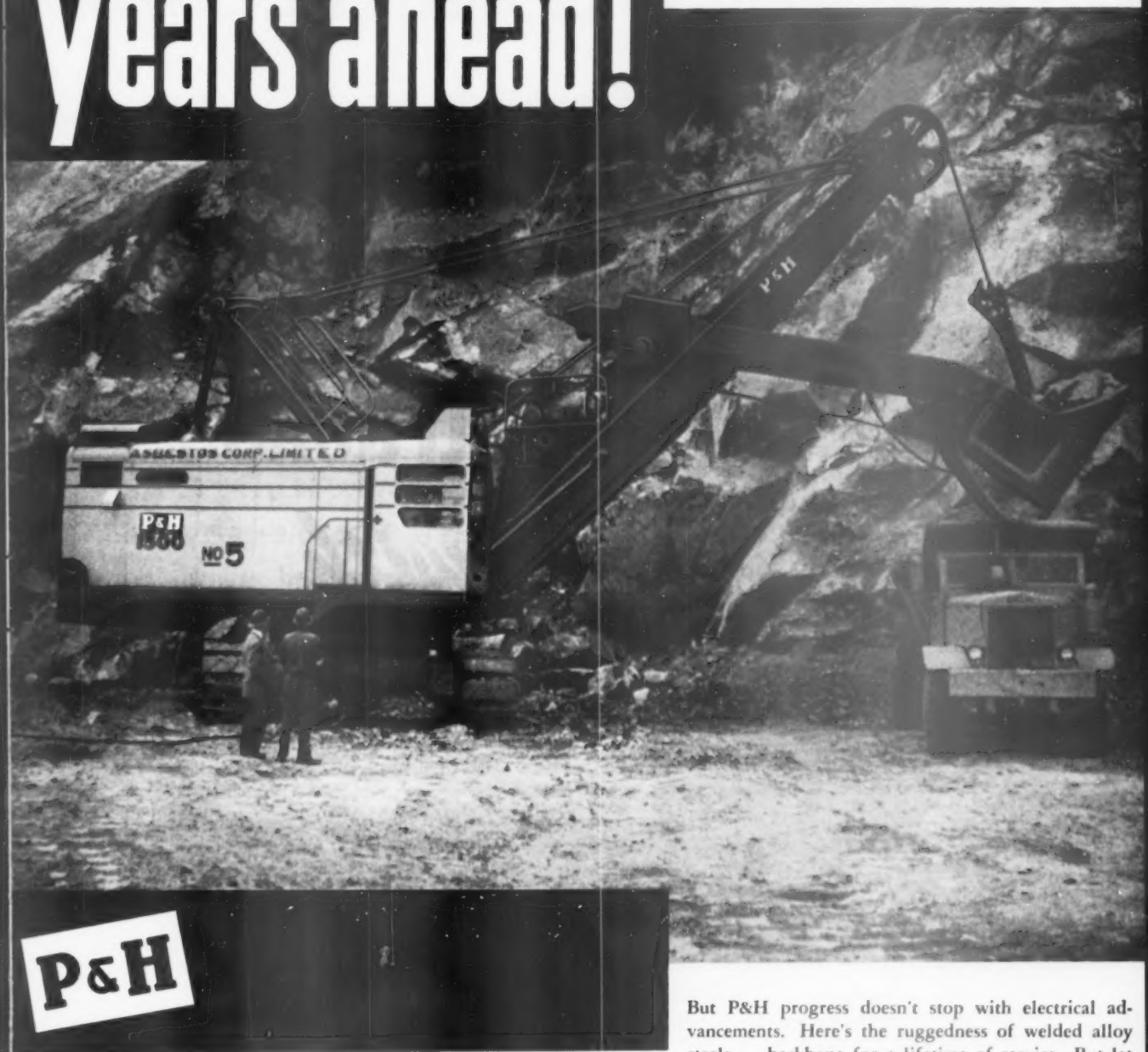
Write for complete information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

years ahead!



P&H

Here's progress far ahead of old fashioned designs — progress that pays off in steadier production . . . lower tonnage costs! For example —

P&H stepless power regulation gives you smoother, more accurate control . . . completely eliminates the complex make-and-break contactors which cause trouble. Furthermore, P&H Magnetorque* Hoist Drive powers hoisting motions electro-magnetically — gives you faster dipper action . . . freedom from maintenance worries.

But P&H progress doesn't stop with electrical advancements. Here's the ruggedness of welded alloy steels — backbone for a lifetime of service. But let us direct you to a P&H in action — see *all* the modern refinements that make P&H the top producer in the open pit.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

Every third P&H Electric Shovel sold is a repeat order

P&H LARGE EXCAVATOR DIVISION

HARNISCHFEGER

CORPORATION

4400 W. NATIONAL AVENUE • MILWAUKEE 46, WISCONSIN

The P&H Line

TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PRE-FABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

BOWIE SAND & GRAVEL CO.

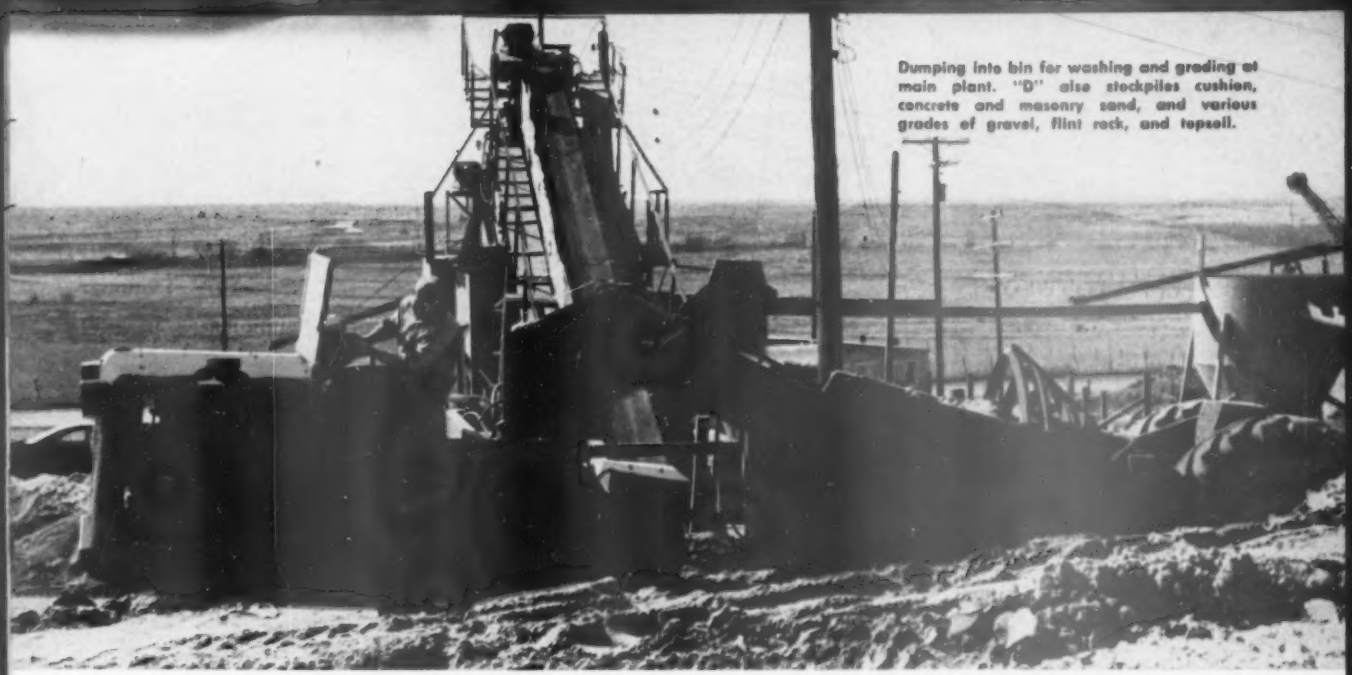
replaces

1 shovel
3 trucks
with
1 Tournapull

D Roadster moves into pit to begin loading. Water, caused by seepage from reservoir, does not slow operation or affect rig's 4-wheel air brakes. All material is selectively self-loaded from one 1200' pit.

R.G. LeTOURNEAU INC.

YARDS PER HOUR, not yards per load, PUT DOLLARS IN YOUR POCKET



Dumping into bin for washing and grading at main plant. "D" also stockpiles cushion, concrete and masonry sand, and various grades of gravel, flint rock, and topsoil.

"D" strips pit... selectively self-loads various grades of sand, gravel... stockpiles finished material

Bowie Sand & Gravel Company supplies sand, gravel, topsoil and fill to contractors, home owners and cities throughout northern Texas. Material is usually obtained from one pit, and, up until a year ago, was hauled to the washing plant by shovel-loaded dump trucks. This method had several drawbacks. The shovel could not readily separate the various grades of material... production was low ... and the plant almost always behind in filling orders.

When company owner Sam H. Coffman opened a new pit, he decided to try a high-speed, rubber-tired D Tournapull for the complete loading and feeding job. Self-loading at all times, his 7-yd. "D" stripped topsoil and dirt which had been filled in... excavated and hauled sand and gravel to the hopper... and stockpiled various grades of finished materials for future sale.

"My D Roadster has replaced 3 trucks and one ¾-yard shovel on this job, and eliminated the wages of 3 hired men," reports Mr. Coffman. "I now sell everything from grass roots to the bottom of the gravel pit because I can keep it separated with my LeTourneau. We have also been able to stockpile 3,000 to 4,000 yards of reserve material, something we have never been able to do before."

Boosts output... delivers 100 cu. yds. hourly on 1500' haul

Coffman finds his 28 m.p.h. Tournapull particularly well adapted to this job because: (1) With this 1 machine, 1 man can handle entire load-haul-and-stockpile operation ... (2) In addition, by averaging 5 pay yards per load and completing typical 3000' cycles every 3 minutes, the "D" produces enough material to keep the entire plant busy... (3) Due to adequate supply of material at all times, plant production is increased sufficiently to allow plant crew enough time during the regular 8-hour day for overhauling the Company's 5 dump trucks and other equipment. Since starting job, "D" has worked over 1600 hours, with no down-time for mechanical troubles.

These are but a few of the reasons why leading pit and quarry operators are using Tournapulls for the lowest-net-cost-per-yard. It will pay you to see your LeTourneau Distributor and check your pit costs against modern Tournapull economy. He can give you all the facts, or arrange for a demonstration of the "D" on your job.

Self-loading wet silica sand, "D" picks up 5 pay yards. Note excellent condition of tires after 1625 hours work in this abrasive material.

Tournapull—Trademark Reg. U. S. Pat. Off. DP-132-3

R. G. LeTOURNEAU, INC.

Peoria, Illinois

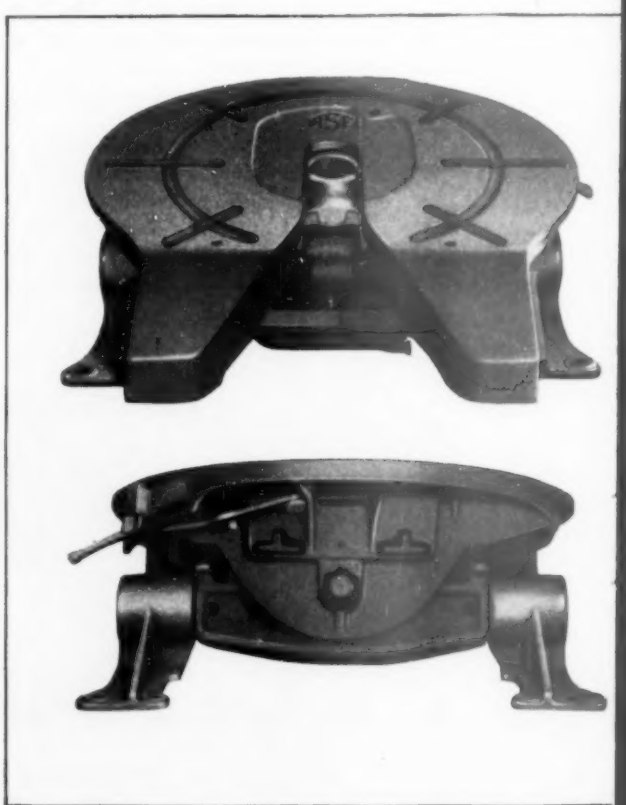
One of the four tandem units operated by Marquette Cement Company's quarry at Oglesby, Ill. . . . where ASF Safety 5th Wheels are standard equipment. Gross weight, including tractor, is 175,000 pounds; gross weight hauled by front 5th wheel, 160,000; net weight of load, 80,000.

20,000 pounds—down the hatch!

If you were looking for an operation that punishes 5th wheels, you couldn't find a tougher one than this. Side dumping—with the weight of the trailer and the load thrown off balance—builds up a wrenching, twisting strain that's concentrated on the 5th wheel. Not just once in a while, but many times—day in and day out.

Heart of the tandem—the ASF 5th Wheel

Here's the 36" extra-heavy-duty ASF Safety 5th Wheel made especially for the rugged service and heavy loads found in off-highway work. Cast alloy steel gives it the strength needed for handling loads up to 100 tons . . . side oscillation gives your units the flexibility needed to absorb the twisting side-strains of uneven roads.



The Marquette Cement Company proves that your best investment for safety and heavy-duty service is an ASF Safety 5th Wheel . . .

"best 5th wheel we've ever used"

Quarry work—just by the nature of the operations involved—gives most any kind of equipment a beating. And 5th wheels get their share!

As a case in point, take Marquette Cement Company's quarry in Oglesby, Illinois, where side-dumping tandem units are operated, each unit with 40,000 pounds net load. Read what Bill Spurr, Quarry Superintendent, has to say about his firsthand experience with ASF Safety 5th Wheels:

> **"We have been using ASF Safety 5th Wheels exclusively on our 4 tandems and 2 semi's for the last 6 years. The wheels we used before that time often took an hour or more to uncouple, but the problem was solved quickly by switching to ASF wheels. Now it doesn't take us more than 10 minutes to couple or uncouple.**
>
> **"Side dumping of the load into the crusher hopper puts a heavy twisting strain on these 5th wheels, and in the case of the tandems, the front wheel is often pulling over 160,000 pounds gross.**
>
> **"That's tough service, and these ASF Safety 5th Wheels are the best 5th wheels we've ever used."**

There are sound reasons why ASF 5th Wheels can stand up in tough service. For example, the "I" beam crossbar is a recent development that helps the ASF 5th Wheel keep pace with the stresses of heavier equipment carrying heavier loads. King-pin bearing area is the largest of any 5th wheel made. Coupling is quick and easy—but uncoupling is impossible when the easy-to-see lock lever is in "locked" position. Side oscillation adds flexibility to your entire unit—tractor and trailer—so that it "rolls with the punch" instead of rigidly resisting the side strains of uneven roadway.

For complete freedom of interchange between motive power and load-carrying equipment, you can't top the quick convertibility of the *tractor trailer*. And, for the facts on the best 5th wheel investment you can make, see your nearest ASF Distributor, or write: American Steel Foundries, Automotive Division, 410 N. Michigan Avenue, Chicago 11, Ill.

remember this . . . about ASF safety 5th wheels

Largest king-pin bearing area of any 5th wheel . . . Stresses absorbed by a larger bearing area—larger than any other 5th wheel—means longer life for king-pin and jaws.

Shorter king-pin bending leverage . . . Jaws grip the king-pin at the top. The pin *stays straight*—and can't "spring" or disengage.

Side oscillation protects equipment . . . 1½° of free oscillation—plus 5½° controlled by rubber stabilizers—absorbs sidestrain of uneven roadway.

Heavy, cast alloy-steel construction . . . Plate is hinged on strong, rigid "I" beam with big 2" pin. Extra large contact area between plate and beam doubles rocker life. Both rocker and cast-steel bracket are bronze-bushed to cut wear to a minimum.

Easy to maintain in perfect operating condition . . . Wear is inevitable, but on ASF Wheels, it's easily counteracted simply by inserting one or more low-cost shims between buffer and housing front wall. Result? Like-new service, without expensive rebuilding!

A quick glance tells you the lock is LOCKED . . .

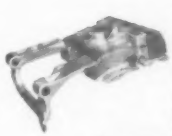
LOCKED—as quickly shown by the lever position. The easy-to-see lever can only be in this position when the jaws are truly locked.

UNLOCKING—with an easy twist of the wrist. Simply move the safety dog up, and pull the lever forward.

UNLOCKED—and ready for coupling. The lever moves back to locked position only when the jaws are locked!

A 3,000-pound "compression-grip" saves your maintenance dollars . . .

COUPLING—as the king-pin enters the jaws, the jaws are forced back against the exclusive ASF rubber buffer block, building up compression.



COMPRESSING—3000 pounds are built up before the lock clears the rear jaw, allowing lock to snap to locked position.

LOCKED—and the jaws *remain* under compression. The grip is like a vise: eliminates the slack and backlash that can cost you money in added 5th wheel and king-pin wear.

NEW HORSEPOWER!
NEW BRAKING POWER!
NEW EARNING POWER!

Biggest truck values of the year! New, just-announced Dodge trucks with features like . . .

7 high-compression engines, with 100 to 171 horsepower, give you more ton-miles per hour, more deliveries per day! New styling inside and out, tough new floors in pick-up and panel bodies, new tighter-than-ever tailgates on pick-ups and expresses! A total of more than 50 brand-new features to boost truck earning power!

More, you get such famous Dodge extra values as lightweight aluminum-alloy pistons, rivetless Cyclebond brake linings on all hydraulic brakes, moistureproof ignition, shot-peened rear axle shafts! Get more truck for your money . . . see your neighborly Dodge dealer!

NEW!

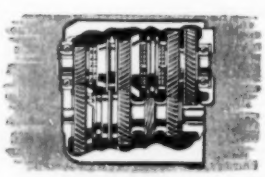
MORE POWERFUL ENGINES!

7 high-horsepower engines! 3 brand-new, with increased displacement, greater cooling capacity, twin carburetion available on larger trucks!

NEW!

BETTER BRAKING!

Super-safe brakes stop smoothly, easily, with less pedal pressure! New increased stopping ability on 1- thru 2½-ton trucks!



NEW!

NO GEAR-SHIFTING!

Truck-o-matic transmission with gyrol Fluid Drive available on ½- and ¾-ton models! Saves shifting, yet lets you rock out of snow, mud!

NEW!

OVER 50 FEATURES!

Reinforced cab construction, larger exhaust system, new 116" wheelbase ½-ton pick-up! Dodge-Tint glass, higher output heaters available!

There's one to fit your job . . . ½-ton through 4-ton. See your friendly Dodge dealer.

DODGE "Job-Rated" TRUCKS

Tractor-Scraper Parts rebuilt with VICTORALLOY

outwear new parts 2 to 1

In addition . . .
VICTORALLOY cuts rod cost and reduces welding time 25 to 50%.

HERE'S HOW:

VICTORALLOY is an all-position rod . . . vertical surfaces, end bits, blades, etc., can be hardfaced in position.

High burn-off rate, 6 lbs. per hour, speeds application.

One pass with VICTORALLOY'S high, rounded bead deposits as much metal as most rods do in two passes.

No slag interference—you eliminate chipping and cleaning.

Try VICTORALLOY NOW. Order a supply from your VICTOR dealer TODAY.

VICTORALLOY is designed especially for track rollers, idlers, grousers, end bits, cutting edges, tamper feet and other parts subjected to continual abrasion and severe impact. Its high chromium content produces a hard, polished finish that reduces friction . . . and doubles working life.

Write for literature on complete line of hardfacing alloys by VICTOR. Dealer inquiries invited.

VICTOR

Welding and Cutting Equipment Since 1910

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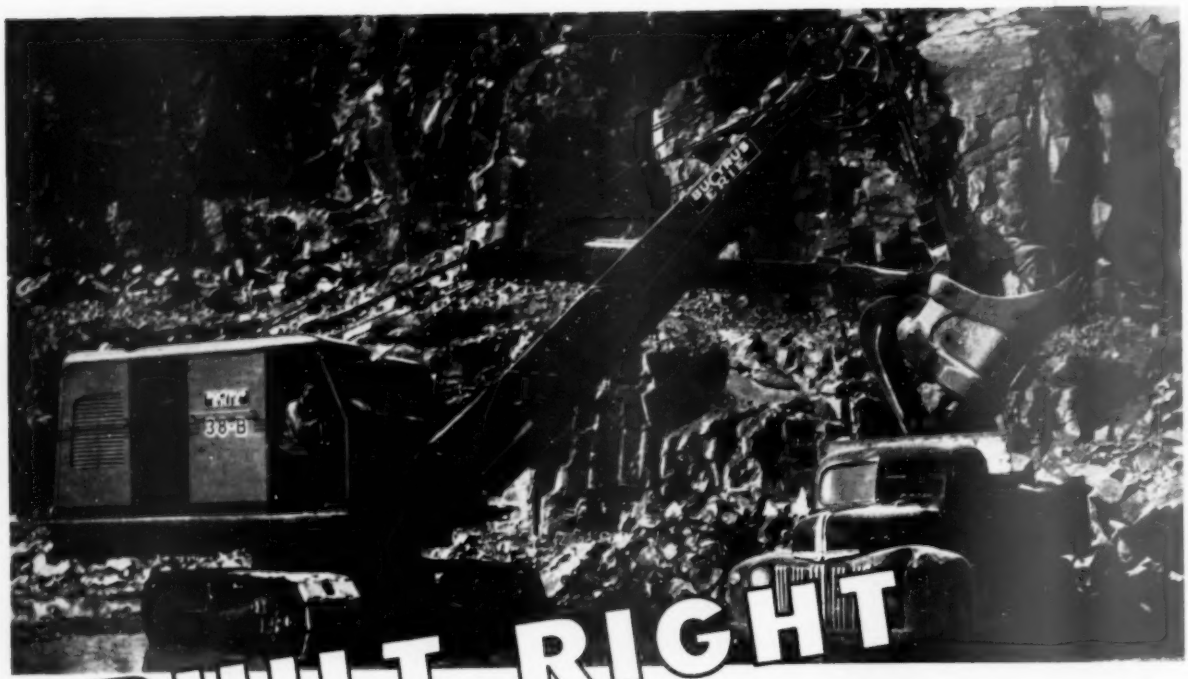


BUILT RIGHT for ROCK . . . the Facts show why!

Durability for hard digging shift after shift, year after year — that's a basic reason why more Bucyrus-Eries are used for output in rock than any other make of excavator. There's plenty of strength for rough rock work, plus other rock-tested features that mean steady high output:

Strength without Deadweight — from boom point to treads for greater work capacity per pound.

Big Cool-Running Clutches and Brakes — easy to operate, easy to keep cool, easy to adjust and maintain.

Heavy-Duty dippers — with cast manganese steel lip for greater wear resistance.

Smooth Power Flow — with liberal use of anti-friction bearings and simple, effective lubrication.

Individual Design for each model — with size and strength in every part to match rated capacity. That means you can tackle tough rock jobs right up to any model's rated peak regularly . . . without fear of premature, costly breakdowns.

For dependable, *profitable* output on your job, see your B-E distributor soon and plan to put a Bucyrus-Erie to work for you. 90E52

⅜ to 4-yd. Gasoline, Diesel or Single Motor Electric Drive

Most Compared • Most Preferred

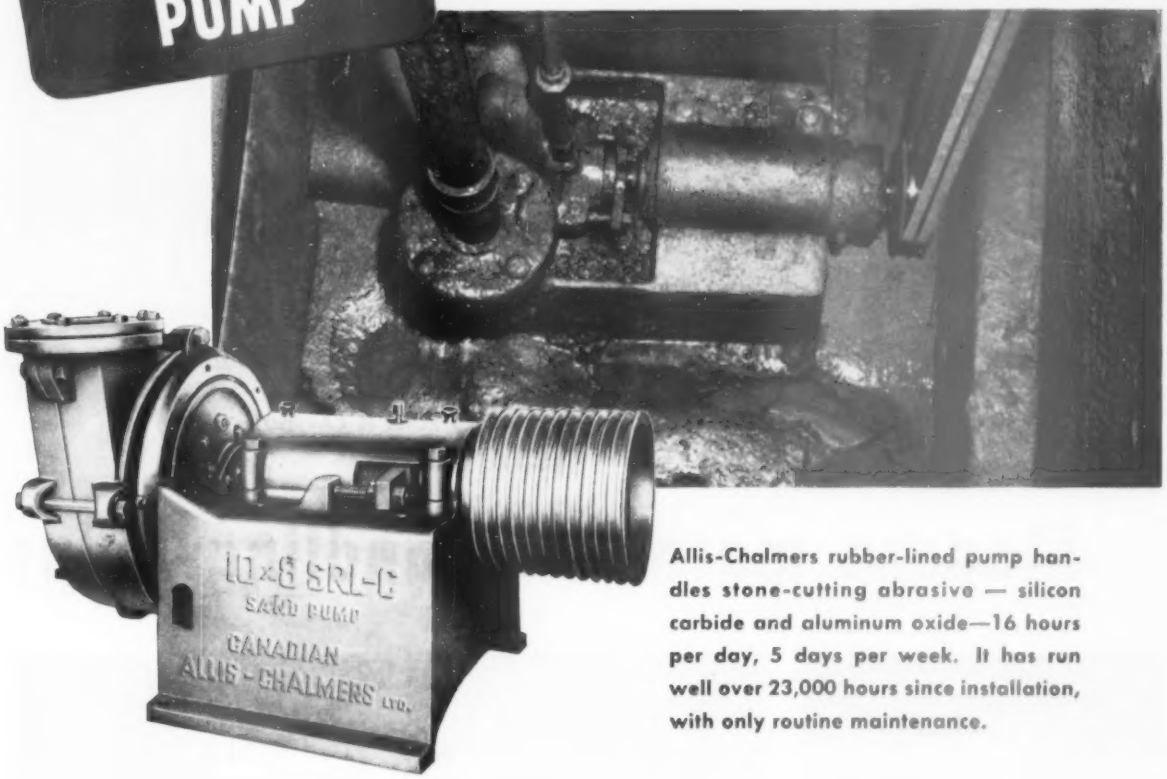
BUCYRUS ERIE

South Milwaukee Wis.

. . . OVER 23,000 HOURS and still running!

(Best Previous Pump — 1040 Hours)

ALLIS-CHALMERS
RUBBER-LINED PUMP



Allis-Chalmers rubber-lined pump handles stone-cutting abrasive — silicon carbide and aluminum oxide—16 hours per day, 5 days per week. It has run well over 23,000 hours since installation, with only routine maintenance.

PUMPING RECORDS like this are not unusual with the Allis-Chalmers rubber-lined pump. Service life up to 50 times that of the best alloy pumps is common. Pumping costs are greatly reduced because of reduced maintenance and repair costs and also because of fewer production interruptions and less lost production time.

Unique Lining Method

The rubber lining of the Allis-Chalmers SRL rubber-lined pump is bonded to a heavy steel skeleton which is bolted into the casing. This arrangement provides maximum support for the liners but makes them easy to remove when it is found necessary.

Each Installation Specially Engineered

Every pump is individually engineered to provide the best possible performance for the application involved. Special rubber linings of various compounds handle a wide variety of slurries at low cost per gallon pumped.

If you are handling sand, taconite, grinding mill discharge, tailings or any other abrasive slime or slurry and want longer pump life, see your Allis-Chalmers representative. Or write Allis-Chalmers, Milwaukee 1, Wis., and ask for Bulletin 08B7311.

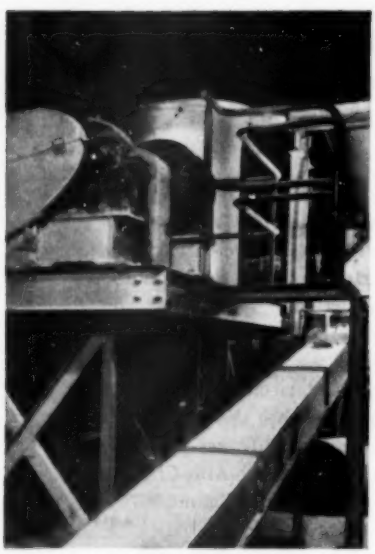
A-3953

ALLIS-CHALMERS

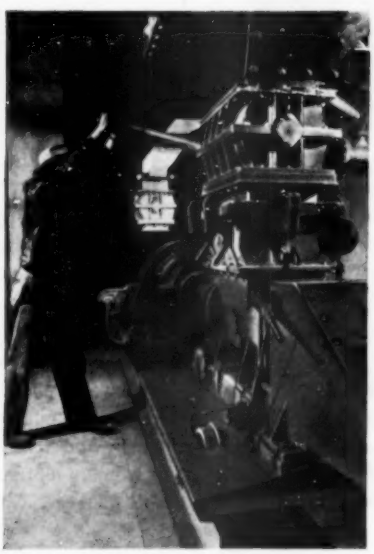
1 LIMESTONE IS DELIVERED in cars from quarry to primary crusher and hammermill. G-E powered crane is used by operator to keep rock from jamming in crusher.

2 CRUSHED ROCK IS CARRIED to storage by a 30-inch, 1200-foot-long conveyor. This sturdy G-E 60-hp motor starts the fully loaded belt without difficulty.

Modern materials handling helps



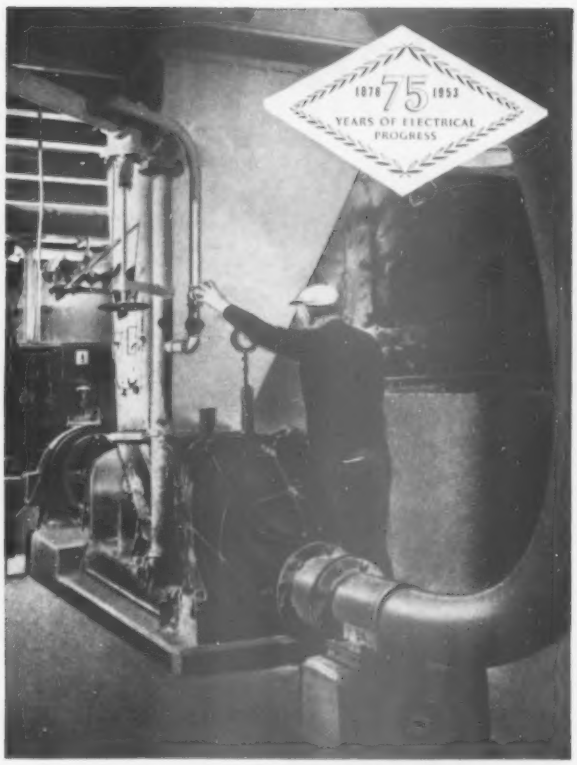
5 PULVERIZED STONE is fed to kilns by screw conveyors powered by a G-E selsyn drive system which coordinates screw speed and kiln rotation.



6 FINISHED CEMENT is pumped to packhouse by portable Fuller-Kinyon pumps. G-E 200-hp drives enable each to deliver 600 barrels per hour.

7 CONVEYOR DELIVERS filled bags to dock for loading into cars. Compact G-E gear-motor transmits maximum torque, provides uniform speed.

3 **ROUGH BLENDING** is done in storage by two G-E powered heavy-duty d-c cranes which dump selected rock into hoppers for delivery to the raw-grinding mills.



4 **FROM GRINDING MILLS** pulverized stone is conveyed through a 10-inch pipe to blending bins. Fuller-Kinyon pump, G-E powered, pumps 120 tons per hour.

Universal Atlas reach peak output

G-E equipped system at Hudson, N. Y. cement plant keeps operation continuous from quarry to pack-house

Every cement plant has the same kind of materials-handling problem that Universal Atlas Cement Co. faced at their Hudson, N. Y. plant: *to minimize interruptions in the flow of materials being processed.*

Here's how Universal Atlas achieved this goal: their engineers designed a materials-handling system made up of the most up-to-date equipment available. Plans included standby equipment and materials stockpiles at strategic locations to provide for necessary equipment maintenance. Then, reliable, long-life G-E drives were used for the entire system. The success of this carefully planned program is evident today when record production flows smoothly through the plant.

A modern materials-handling system integrated with production operations can eliminate bottlenecks and increase production in your plant. To help you achieve these goals, G-E application engineers are ready to work with you and your equipment manufacturer to solve electrical problems involved. Contact your nearest G-E Apparatus Sales Office today.

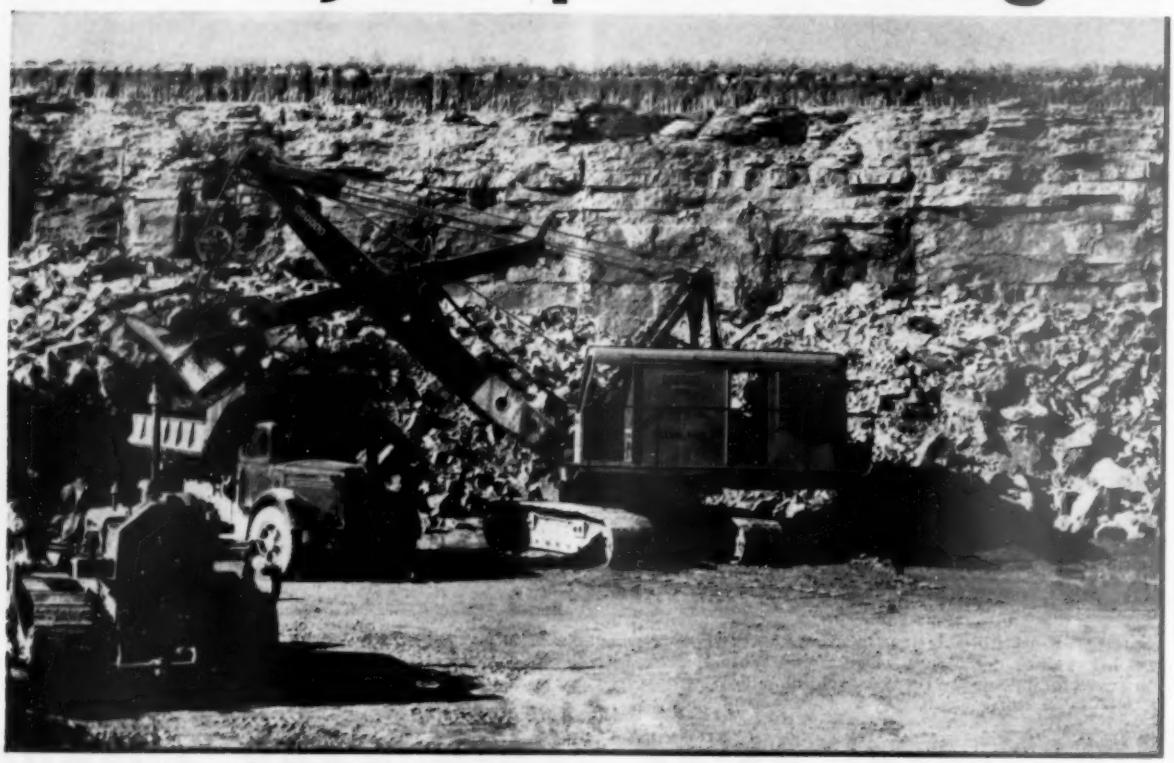
Most efficient way to modernize shown in new PROGRESSIVE MECHANIZATION program

To help you set up a step-by-step plan for bringing plant operations to peak efficiency, G.E. has developed the new *Progressive Mechanization Program.* Ask your G-E apparatus representative for details, or write to General Electric Company, Sect. 658-11, Schenectady 5, N. Y.

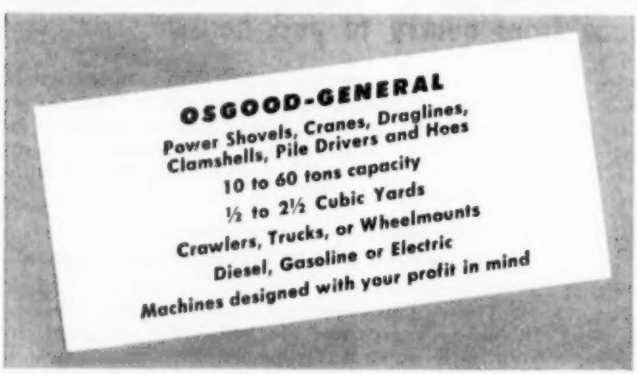
Engineered Electrical Systems for the Rock Products Industry

GENERAL ELECTRIC

Widen your profit margin!



OSGOOD ROCK SHOVELS with Torque Converters load more rock...in less time...with less wear

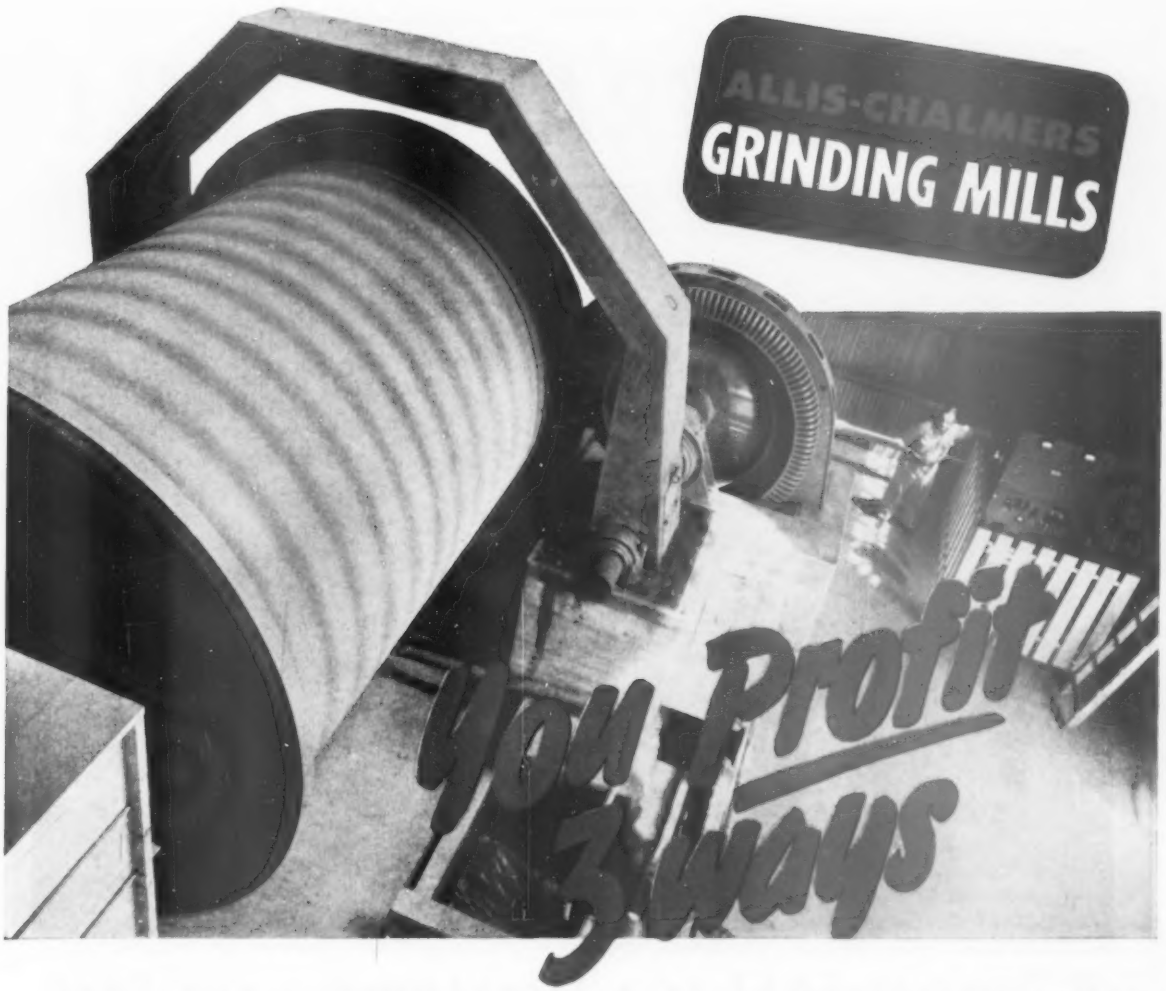

OSGOOD-GENERAL
Power Shovels, Cranes, Draglines,
Clamshells, Pile Drivers and Hoes
10 to 60 tons capacity
½ to 2½ Cubic Yards
Crawlers, Trucks, or Wheelmounts
Diesel, Gasoline or Electric
Machines designed with your profit in mind

Reports from the quarries reveal that OSGOOD Shovels with Torque Converters are setting new production records because of faster loading cycles and smoother operation that drastically reduces wear and maintenance. Operators especially like the fact that these OSGOODS cushion the shocks and will do anything in the book—even "pick-toe," for instance—a maneuver that is practically impossible with many other machines. For detailed information, consult the nearest OSGOOD-GENERAL Distributor.

OSGOOD O-G GENERAL

MARION, OHIO

OVER 100 YEARS OF ENGINEERING PROGRESS



...WHEN YOU SPECIFY ALLIS-CHALMERS GRINDING MILLS

1 YOU CAN BE SURE of getting a grinding mill specifically suited to your requirements. A wide range and multiple combinations of types and sizes assures this . . . assures top, economical performance year in, year out.

2 YOU GAIN the seasoned benefits and *unequalled* experience accumulated through the successful installation of more than 4200 Allis-Chalmers mills over a period of 70 years.

3 YOU ARE DOUBLY ASSURED of completely balanced operation, with its resulting economies, when you equip your mills with motors, drives and controls — all manufactured in A-C shops.

NEW 44-page grinding mill bulletin 0786718A is chuck full of valuable tables and grinding mill information. Get it from A-C representative in your area or write Allis-Chalmers, Milwaukee 1, Wis. A-3706

Pulverator is an Allis-Chalmers trademark.

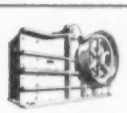
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverator

Gyratory Crushers

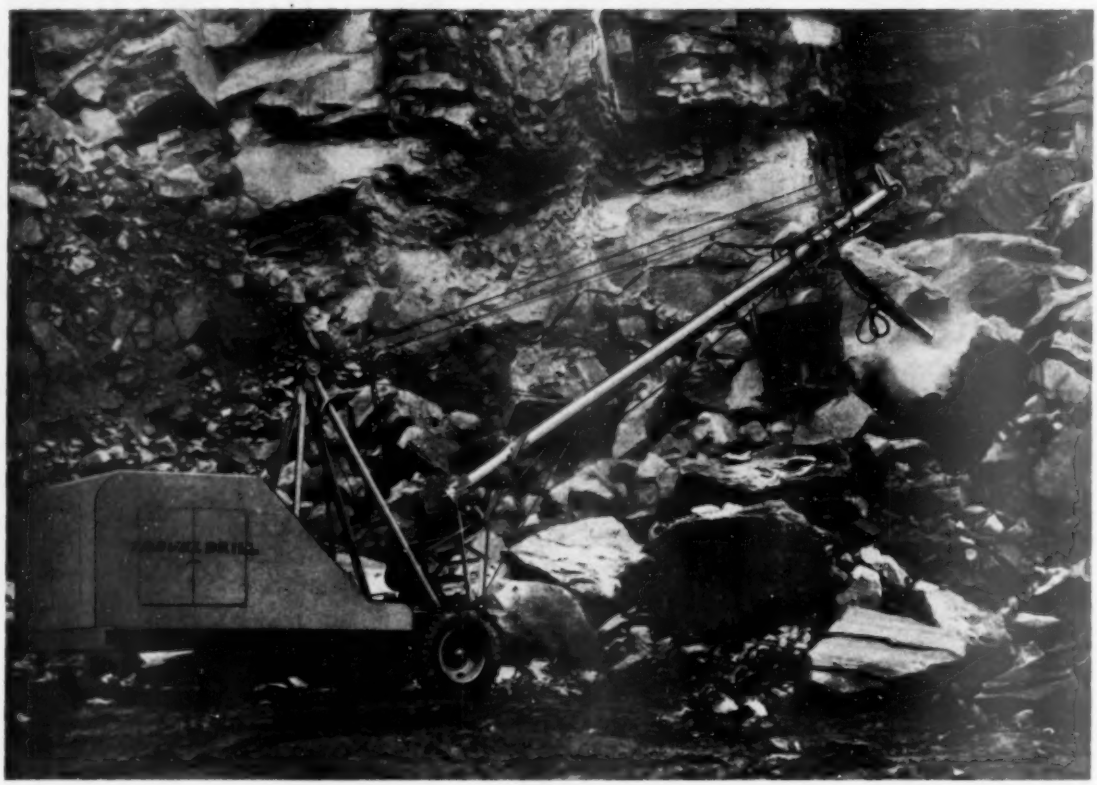

Jaw Crushers

Grinding Mills

Vibrating Screens

Kilns, Coolers, Dryers

THE REVOLUTIONARY NEW MOBILE TRAVEL DRILL



9 TIMES AS FAST AS A JACKHAMMER — AND SAFE

Designed and built primarily for secondary drilling in quarries, the TRAVEL DRILL is a complete self-contained drill unit mounted on chassis with pneumatic tires and diesel-driven compressor units. In front is mounted a 40-ft. boom on which the operator's chair and all controls are located. The trolley-mounted chair travels in and out on the boom. Attached to trolley is a 3-in. drifter with 4-ft. screw feed located just in front of operator. The unit is operated by one man, and self-powered for travel to drilling area. Simple to operate, any average workman can become expert with it very quickly.

DRILLING SPEED • ECONOMY
MOBILITY • SAFETY

GET FULL INFORMATION FROM

HOW IT CUTS COSTS AND SPEEDS PRODUCTION

Drilling over 70 ft. per hour in granite, the new TRAVEL DRILL replaces 6 to 8 jackhammer men, their equipment, and the compressed air they use. Doubles life of bits, as breakage on drill steel is at least 50% less than with jackhammers. Drills boulders in any position at any angle, up to 35 ft. above quarry floor, eliminating costly lost time of moving boulders with shovel. Flexibility of the machine permits drilling holes to 24-ft. depth.

HOW IT ASSURES SAFETY

Operator is never on the ground from time he starts the engine. Enclosed in his chair with metal roof, side and back curtains, he is safe from rolling boulders, injury through falling or slipping on the muck pile, or injury to eyes or lungs from stone dust or particles. He is 6 to 10 ft. from drill dust when drilling, and is also protected from the weather.

THE TRAVEL DRILL CO. Inc.

P. O. BOX 1124

RALEIGH, N. CAROLINA

4 powerful reasons why 1953 CHEVROLET Advance-Design Trucks give you more of what you want

MORE POWER—GREATER ECONOMY! Expect a wonderful advance in power, performance and economy in Chevrolet heavy-duty trucks! The great 1953 Loadmaster engine—standard on 5000, 6000 Series, heavy-duty and forward control models, optional on 4000 Series heavy-duty trucks—has a new high compression ratio of 7.1 to 1, develops even more horsepower than before. And the Thriftmaster engine in light- and medium-duty models brings you traditional Chevrolet economy.

TRUCKS ENGINEERED FOR YOUR PAYLOADS! Chevrolet trucks are designed for the job they will do—engineered from tires to axle, springs, clutch and power plant to do that job with the greatest efficiency and lowest cost. You don't waste money on too heavy a truck or too light a truck. You buy the *right* truck for *your* job!

MORE STAMINA! More strength where strength counts most! In 1953, all Chevrolet trucks have stronger, brawnier, more rigid frames. They have heavier, sturdier construction that means a longer, lower-cost life for your truck. And they have new larger, safer, longer lasting brakes on many models, too!

GREAT TRUCK FEATURES! In addition to the many *NEW* things you'll find in these 1953 Chevrolet trucks, you'll also find many great features yet unmatched by other makes of trucks. Features such as Flexi-Mounted Cabs, Unit-Designed Bodies, Ball-Gear Steering and many others help make Chevrolet Advance-Design trucks your greatest buy. Chevrolet Division of General Motors, Detroit 2, Michigan.

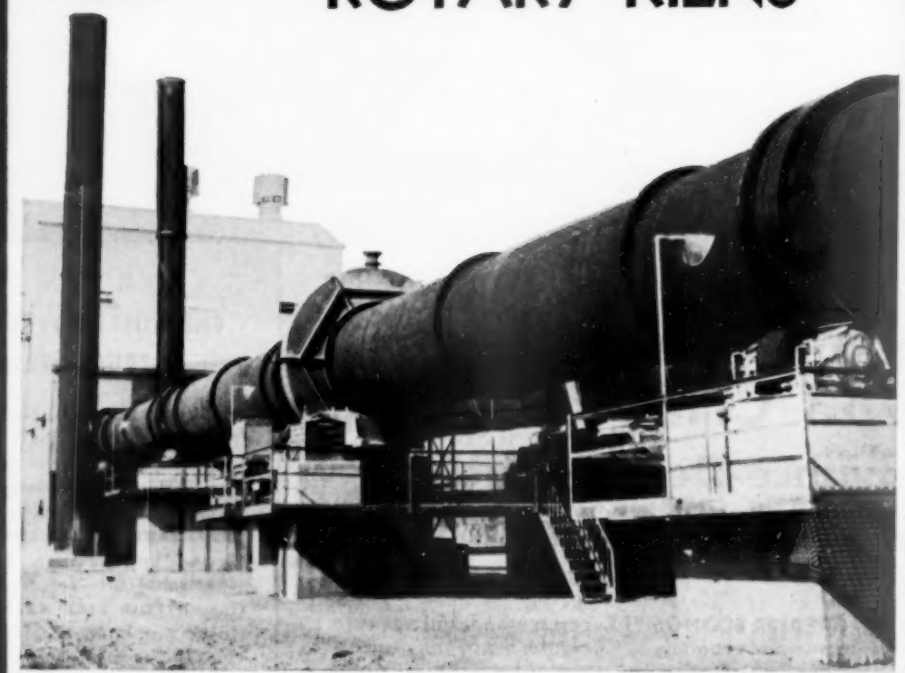
CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTI-PANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

CHEVROLET
first in demand
in value
in sales

SMIDTH

ROTARY KILNS



Smidth machinery has been supplied to over 70 countries of the world including 1000 rotary kilns and 5000 grinding mills, plus auxiliary machines such as coolers, agitators, washmills, pumps, conveyors, packers, separators, etc. for use in Cement, Lime and Ore plants.

For Smidth Machinery apply to:

F. L. Smidth & Co., A/S Vestergade 33, Copenhagen K, Denmark	**F. L. Smidth & Co.** 11 West 42nd Street New York 36, N. Y.	**F. L. Smidth & Co., Ltd.,** 105, Piccadilly, London, W. 1, England
F. L. Smidth & Cie France 80 Rue Taitbout Paris (9e) France	**F. L. Smidth & Co. of Canada, Ltd.** 11 West 42nd Street New York 36, N. Y.	**F. L. Smidth & Co. (Bombay) Ltd.** 42 Queen's Road Bombay, India

"WE HEAR..."

March, 1953

Construction contract awards in the 37 states east of the Rockies in 1952 totaled $16,774,936,000, which was a 6 percent increase over the previous all-time high established in 1951, according to an F. W. Dodge Corp. report. Contributing significantly to the over-all total was the year-end heavy engineering figure of $3,412,368,000 which was up 25 percent over 1951's comparative total. Residential awards of $6,667,504,000 were up 7 percent, while non-residential awards of $6,695,064,000, were down 2 percent. Construction awards for the month of December amounted to $1,467,384,000, representing increases of 18 percent over November and 19 percent over December of 1951.

* * * * * * * * * *

Production of magnesium in the third quarter of 1952 totaled 27,722 tons, a 4 percent increase over second quarter production. Shipments increased 5 percent during the same period, while stocks amounted to 6335 tons, or approximately three-fourths of the average monthly shipment during the third quarter.

* * * * * * * * * *

Damage and injunction suits against industry, which have become increasingly popular with home owners in the past few years, recently received a set-back in Detroit, Mich., when the Michigan Supreme Court remanded a $25,000 damage suit to the County Circuit Court for dismissal. Twenty-five home owners had sought $1000 damages each against a concrete block company for "nuisance noise and vibrations," allegedly caused by company truck operations.

* * * * * * * * * *

Large bones that have been classified as dinosaur specimens, approximately 1,000,000 years old, have been found during excavating operations at a Texas gravel plant. Although a complete skeleton has not yet been found, a rear leg bone weighing 99 lb. was unearthed and is now on display at the Texas University museum. Another side-interest at the gravel plant is its "golden gravel." The owner estimates that each ton of gravel shipped from his plant contains about $0.50 worth of gold. He estimates there must be about $22,000 worth of gold in the 44 miles of paving for which he has supplied gravel. No attempt is made to recover the gold as the cost of such recovery would exceed the value of the product.

* * * * * * * * * *

About $80,000,000 of Maine Turnpike Authority bonds are being placed on sale by the authority and an underwriting syndicate to finance a $60,000,000 Portland-Augusta extension to the present Kittery-Portland roadway, and for retirement of about $20,000,000 existing obligations. The proposed extension would make the Maine Turnpike about 110 miles long.

* * * * * * * * * *

A rush order for a ton of plaster, recently received from a Puerto Rican hotel owner, was quickly filled by National Gypsum Co., Buffalo, N.Y., which hurried 40 50-lb. bags via the airlines. The fact that the freight charges amounted to three times the cost of the plaster was of small consequence to the hotel owner who wanted the plaster in time to complete a remodeling job before the "tourist season" began, and wanted the same plaster as used in the original construction.

* * * * * * * * * *

A rather ironic feature of the acute cement shortage which struck a few areas last fall, was the emergency revision from bulk to bag allotments to ready-mixed concrete dealers—after the cement producers had gone to considerable expenditure to go from bag to bulk.

WE HEAR

A group of representatives of 28 major U. S. firms which have investments in West German industry recently advised U. S. government officials not to encourage American business to make new investments in West German industry until the Bonn government permits convertibility of the Deutsche mark. Under the present set-up, profits can be used only within Germany itself. The business representatives stated that although they are not hostile to present Bonn government policies which are aimed at convertibility of the Deutsche mark, they unanimously feel that until such convertibility is achieved, all new investment should be withheld.

* * * * * * * * * *

A new machine which miners have termed "Gismo" is claimed to perform work ordinarily done by three different pieces of equipment. It reportedly drills blast holes, scoops up ore and carries it away from the working face of the mine. The machine, which resembles a large dump truck on tractor treads, is said to be capable of scooping up 4½ tons of ore at a time and can be converted for drilling operations in 20 min. Another feature claimed for the Gismo is that its size and shape can be modified to fit different tunnels.

* * * * * * * * * *

Heavy construction awards, nationally, totaled $1,886,500,000 for the first five weeks of 1953, compared with $1,196,798,000 for the corresponding period of 1952, as reported by Engineering News-Record. The 5-weeks' 1953 total, which was an all-time high, was 58 percent above the same five weeks of 1952.

* * * * * * * * * *

The development of a new fuse-testing gadget, made of tenite plastic and costing only $1, has recently been announced. The gadget reportedly can withstand 4000 volts even after being immersed in water for 24 hr. and, according to the supplier, this is the only gadget on the market that can offer this kind of resistance to electricity.

* * * * * * * * * *

Steel supplies should be back to normal by the middle or latter part of 1953, as predicted by a U.S. Steel Co. sales official. Carbon sheets, light plate and strip are expected to be the first in good supply.

* * * * * * * * * *

A mid-western concrete products company is supplementing its concrete business by doing "odd jobs" for some of the city departments. One such project was the placement of white plastic buttons as street-center and crosswalk markers for the city street department which lacked the necessary installation equipment.

* * * * * * * * * *

The Monroe tract, formerly owned by North Jersey Quarry Co., Morristown, N. J., is being developed into a new industrial area serving three New Jersey communities—Morris Plains, Hanover Township and Morris Township. About 32 acres of the large tract had been cleared by the end of 1952, including the rehabilitation of a large gravel pit. Two new plants have already been constructed on the cleared land site.

* * * * * * * * * *

Booming school-construction programs have been reported in the South. Georgia alone has a construction program amounting to $400,000,000 for the next three or four years. It was predicted that the South may become the nation's leader in application of modern design and building methods. Zonolite Co., Chicago, Ill., stated that the trend is shown clearly in job reports turned in by field representatives. The firm also estimates that 1,000,000 lb. of vermiculite, for insulation and aggregate purposes, will be used in the South's construction of new schools during the next five years.

* * * * * * * * * *

The Los Angeles, Calif., city council recently adopted an ordinance permitting sand and gravel operations on a 41-acre plot in a residential area within the city limits. Use of the area for sand and gravel operations was also approved by the city planning commission. Despite the approval by the commission and the council, residents of the contiguous area are protesting the ordinance, declaring the value of their property has decreased 20 percent since application for the gravel permit was made.

THE EDITORS

ALONE IN ITS CLASS for TOP CAPACITY!

THE UNIVERSAL 880 SENIOR "R"

BIG 4'x12' SCREEN

Full 48 square feet of screening area and inclined mounting for top capacity.

BIG 1036 JAW CRUSHER

Famous Universal overhead eccentric force feed action and design for top capacity.

FIELD PROVED AND PORTABLE

Operators report tremendous capacities . . . fast and easy moves and setups. It's designed to meet state weight restrictions.

BIG 3022 ROLL CRUSHER

Roller bearing star gear drive. Designed to use its full 22" width for top capacity.

BIG 30" CONVEYORS

Top capacity loads handled easily.

Before you buy get full details on the new, advanced design Senior "R" Gravelmaster. See your Universal distributor or write for literature.

UNIVERSAL ENGINEERING CORPORATION Subsidiary of **PETTIBONE MULLIKEN CORPORATION**

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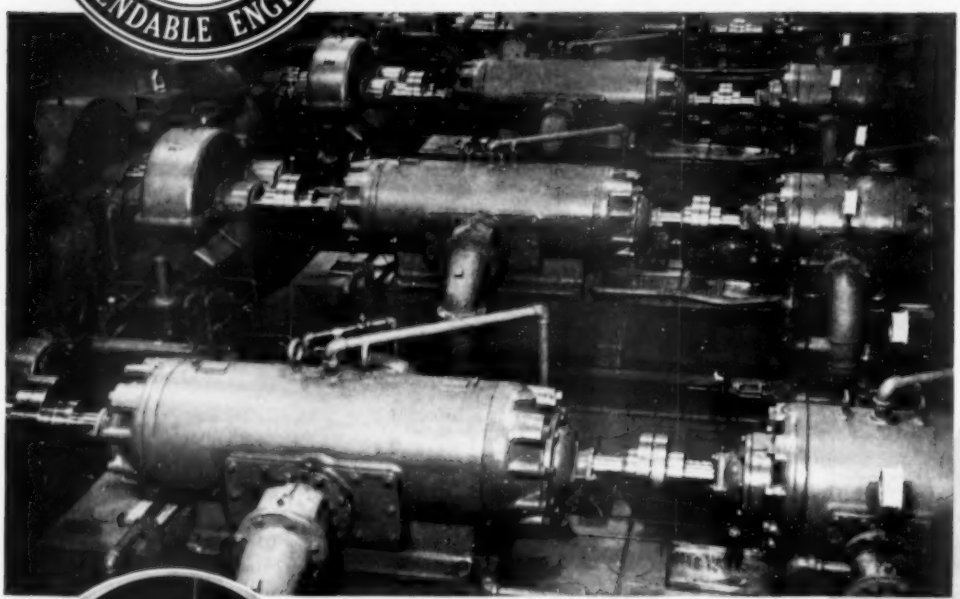
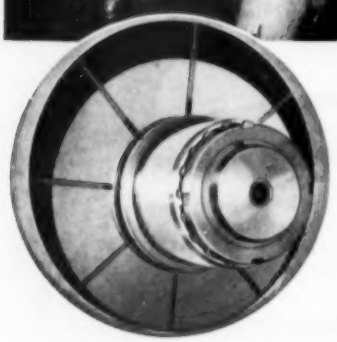
PRATT & WHITNEY AIRCRAFT



Four Fuller Rotary Compressors, Elliott steam-turbine driven, have a total capacity of 6760 c.f.m., at 110 p.s.i.



depends on FULLER AIRPOWER

Four Fuller Rotary Two-stage Compressors put Pratt & Whitney Aircraft's engine plant in East Hartford on a 100 p.s.i. air diet for such operations as shot peening, spray booths, air cleaning, and air-operated chucks.

Pratt & Whitney Aircraft has joined no *small* family of users; food and chemical plants, steel mills and cement mills, gas-gathering plants, refineries, automobile plants, foundries and machine shops, public utilities, and many others depend on Fuller for compressor equipment, wherever air is required.

Whether *your* air-plans call for single-stage, two-stage — single-stage duplex or two-stage duplex—you can be sure Fuller has the compressors which gives you a dependable source of pulsation-free air up to 3300 c.f.m., 125 p.s.i., with maintained capacity for the life of the machine.

Write for Bulletin C-6, Fuller Rotary Compressors.

FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

Fuller

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

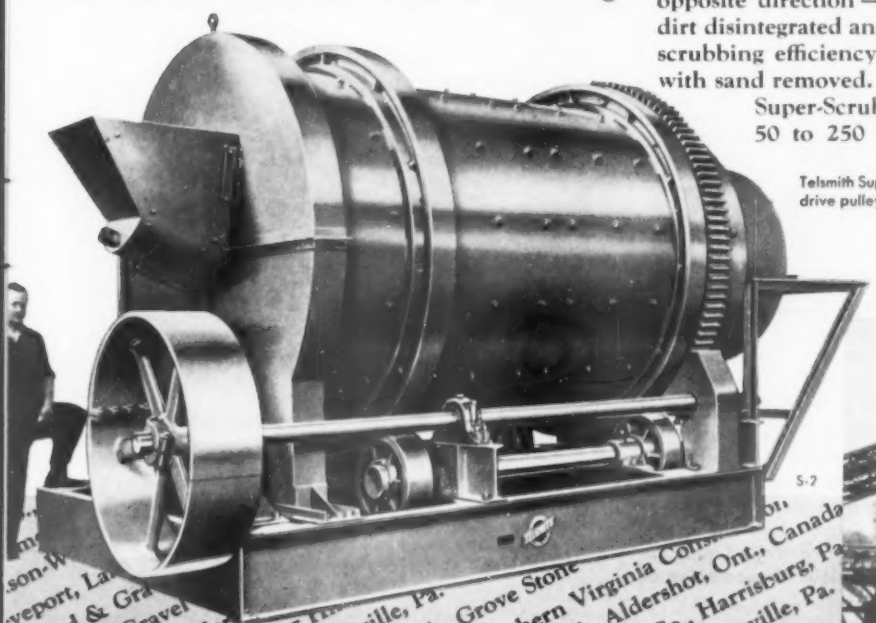
C-225
1624

FOR CLEAN AGGREGATE—HIGH CAPACITY

TELSMITH

Super-Scrubbers®

● **Most of the better sand and gravel pits are exhausted**—those now in use contain more clay, which must be eliminated. Many states now require that crushed stone be scrubbed before screening to eliminate soft stone, clay and dirt. This demands a better scrubber—one which will eliminate large amounts of clay with a minimum of expense for installation, water, power and upkeep. Telsmith's answer—the Super-Scrubber. **Outstanding features: high speed, terrific impact and grinding action,** much like a ball mill. Aggregate travels from feed to discharge end against clean water flowing in the opposite direction — emerges clean — with clay and dirt disintegrated and carried away by the water. Top scrubbing efficiency on coarse aggregate is obtained with sand removed. **A proven success**—the Telsmith Super-Scrubber made in 4 sizes: 60″ to 96″, 50 to 250 tons hourly. Get Bulletin 266.



Telsmith Super-Scrubber complete on steel frame with flat belt drive pulley. Can be furnished with enclosed, silent-chain drive.

●

Three of the five 60-inch diameter Telsmith Super-Scrubbers in Colonial Sand & Stone Co., Inc. plant, Port Washington, New York.

S-2

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...-yeoming Silica Sand Co., Montoursville, Pa.
May Sand & Gravel Corp., Fort Wayne, Ind. Grove Stone
District Sand & Gravel Co., Washington, D. C. Northern Virginia Co...
Buffalo Sand & Gravel Co., Silver Hill, Md. J. Cooke, Ltd., Aldershot, Ont., Canada
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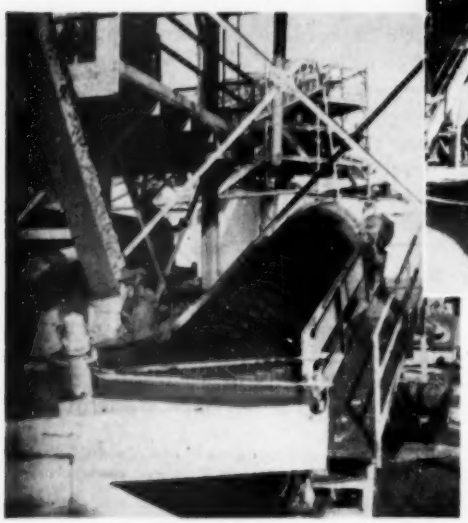
Colonial Sand & Stone Co., Inc., Port Washington, N. Y. Fenton Construction C...
Grove Stone & Sand Co., Swannonoa, N. Carolina Drake-Winkelman, Cuba
New Enterprise Stone & Lime Co., New Enterprise, Pa. Rogers Construction ...
Northern Virginia Construction Co., Alexandria, Va. Sharon Silica Co., Jackson, ...
Rogers Construction Co., Portland, Ore. Meriwether Supply Co., Shreveport, La.
Contee Sand & Gravel Co., Fairland, Md. Sheffield Steel Co., Linden, Texas
Dutchess Quarry & Supply Co., Poughkeepsie, N. Y. Contee Sand & Gravel Co...
Contee Sand & Gravel Co., Laurel, Md. Miami Gravel Co., Rittenours, Ohio
Prince George Sand & Gravel Co., Laurel, Md. Buffalo Sand & Gravel ...
Kilbuck Sand & Gravel Co., Brinkhaven, Ohio Colonial Sand ...
Harbison-Walker Refractories, Garrettsville, Ohio Davis ...
Silverhill Sand & Gravel Co., Silver Hill, Md. Fi...
Davis Sand & Gravel Co., Clinton, Md. ...
Sharon Silica Co., Jackson, Ohio
Kilbuck Sand & Gravel Co...
J. Cooke, Ltd., Ald...
Drake-Wink...
May...

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Smigworks, Milwaukee

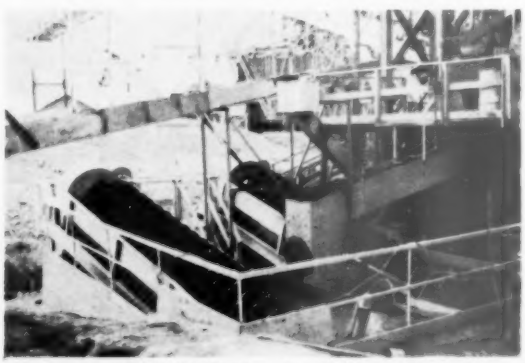
51 East 42nd St., New York 17, N. Y. · 211 W. Wacker Drive, Chicago 6, Ill. · 713 Commercial Trust Bldg., Philadelphia 2, Pa. · 233 Main Street, Cambridge 42, Mass. · Bucket Dept. Co., Milwaukee 1, Wis. · The Midwest Co., 2153 Lakeside Ave., Cleveland 14, Ohio · Marion Equipment Co., 422 Main St., Evanston, Ill. · Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. · Miner Eng. & Equip. Co., San Francisco 4, Calif. · Rich Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 16, Va. · Intermountain Equipment Co., Huntsville, W. Va.

Large Western Sand Producer
uses **WEMCO** SAND PREPARATION MACHINES
in six major plants



KERLINGER — *Two No. 48 Wemco Sand Preparation Machines, with capacity of 60 TPH each, used for desliming and dewatering.*

CENTERVILLE — *Two No. 48 Wemco Sand Preparation Machines, with capacity of 60 TPH each, producing concrete specification sands.*



FAIR OAKS — *Two No. 48 Wemco Sand Preparation Machines, each with 75 TPH capacity, used for preliminary washing of minus 1¼" aggregate.*

For producing clean specification sands, Pacific Coast Aggregates, Inc. has installed Wemco Sand Preparation Machines at six of its California producing locations — Centerville, Elliott, Lindsay, Yolo, Kerlinger and Fair Oaks. From its various producing areas, Pacific Coast Aggregates supplies San Francisco, Oakland and other Northern California areas. The company is among the country's largest sand producers.

The Wemco machines used at these plants are efficiently designed for high sand production. Large settling tank and wide weir overflow are features which assure accurate control of separation. Over a wide range of dewatering or desliming conditions, Wemco units provide for maximum or controlled retention of fines with rejection of materials deleterious to production of specification sands.

WEMCO SAND PREPARATION MACHINE

- **Modern design** — *for greater sand production*
- **Large settling tank** — *wide overflow weir*
- **Sharp separation** — *for specification production*
- **Good drainage** — *for dry, clean sands*
- **Minimum moving parts** — *for lowest operating costs*

If you're interested in specification sands that sell, write today for further information on the Wemco Sand Preparation Machine.

WEMCO
WESTERN MACHINERY COMPANY
351 Tide-Folsom Street • San Francisco 7, California

PRINCIPAL OFFICES
San Francisco • Sacramento • Salt Lake City • Spokane • Denver
Pocatello, Idaho • Phoenix • Chicago • Hibbing, Minnesota
New York • Jeffersonville, Indiana • Toronto, Canada

OTHER WEMCO PRODUCTS
Mobil-Mills • HMS Thickeners • HMS Pumps • Cone Separators
Coal Spirals • Sand Pumps • Drum Separators • Dewatering Spirals
Fagergren Laboratory Units • HMS Laboratory Units • Agitators
Hydroseparators • S-H Classifiers • Thickeners • Conditioners
Fagergren & Steffensen Flotation Machines • Densifiers

THE INSIDE STORY OF CONTROLLED IMPACT ACTION

HERE'S WHY

THE PMCO IMPACT MASTER

gives you top capacity . . . lower costs . . . greater control of finished product size

Adjustable feed plate (1) guides in-coming rock at proper angle into first rotor hammer circle (2). Infed rock is intercepted in motion, exploded instantly by the terrific impact of the rotor hammers and simultaneously projected toward deflector screen grate (3) where finished sizes are immediately discharged.

Oversize particles are deflected upwards, intercepted by feed chute back plate (4) and guided downward into the path of the second rotor hammer circle (5) where they are exploded and projected toward the bottom half of the deflector screen grate and the lower screen grate (7) for immediate discharge.

Both rotor hammers rotate in the same direction toward the rear, promoting fast feeding and keeping all material flowing toward the discharge for top capacity.

Finished product sizes are controlled by the speed of the rotor hammers, and by simple adjustments (8) of stripper bar (6) and lower screen grate.

By controlling the infed rock and directing its flow, the breaking is accomplished by the impact of rotor hammers upon the rock. This reduces wear and makes possible the more uniform gradation cubical aggregate.

GET THE FULL PROFIT-MAKING STORY

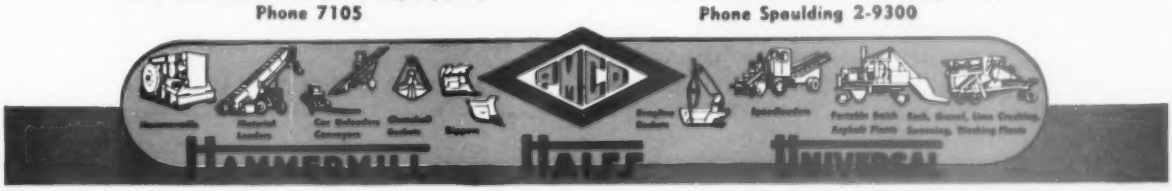
Write for literature. Get complete details on the PMCO Impact Master. Learn all about its high ratio of reduction which eliminates secondary crushers and auxiliary equipment. Get top quality uniform gradation cubical aggregate and greater production of saleable finished sizes. Impact Masters are used in open and closed circuits for producing road-building and concrete aggregates, and can be adjusted for the simultaneous production of aglime when desired. They are available with capacities to 750 tons per hour. Write today.

PMCO Impact Master Division, Universal Engineering Corporation, 625 C Avenue N.W., Cedar Rapids, Iowa

UNIVERSAL ENGINEERING CORPORATION *Subsidiary of* **PETTIBONE MULLIKEN CORPORATION**

625 C Avenue N.W., Cedar Rapids, Iowa
Phone 7105

4700 West Division St., Chicago 51, Illinois
Phone Spaulding 2-9300



PLYMOUTH

MOVES MOUNTAINS!

Here's proof that jobs don't come too big for Texans—or for a *Plymouth!*

Down in Texas a mountain of rock—or nearly that much—is being hauled away by the Longhorn Portland Cement Company. Prime mover in this big rock haul is an 18-ton Plymouth Locomotive. Checking up on how it performs, we contacted Gaines Voight, Chief Engineer on the job, and he had this to say: "The simplicity of its operation is what appeals to our operator —and as for me—well, the overall efficiency of our Plymouth is what I like. We've been using locomotives here since 1929, and in my opinion, this Plymouth is a very excellent machine. We've had it 2½ years and operate it 168 hours a month. Time spent for maintenance and repairs has been negligible."

To cut costs and enjoy similar satisfaction in your own hauling, switching, and spotting operations, PULL WITH PLYMOUTH.

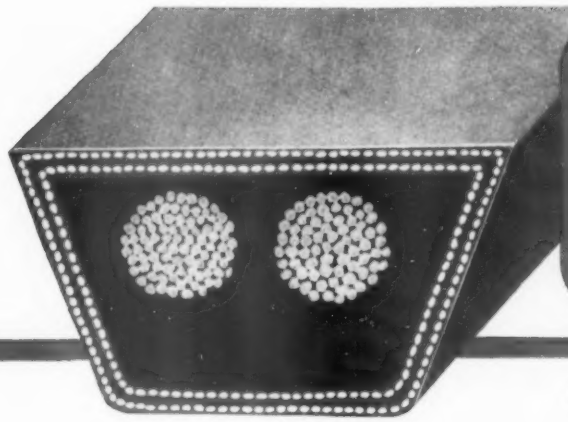
Plymouth models range from 3-ton to 70-ton sizes for narrow and standard gauge track. Your choice of Plymouths includes: Gasoline and Diesel Mechanical, Gasoline and Diesel Torqomotive*, and Diesel Electric. Send for the latest Plymouth catalog. PLYMOUTH LOCOMOTIVE WORKS, Division of THE FATE-ROOT-HEATH COMPANY, Dept. A-5, Plymouth, Ohio.

PLYMOUTH® LOCOMOTIVES

WITH TORQOMOTIVE* DRIVE

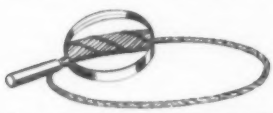
*Torqomotive: Plymouth transmission with hydraulic torque-converter

ALSO MANUFACTURERS OF F-R-H CERAMIC MACHINERY



TEXROPE GROMMET V-BELTS

What is a Grommet?

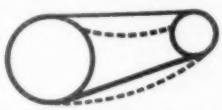


It's the endless rope of strong cords that pulls the load. It's twisted for strength . . . positioned in the belt so every cord pulls its full share of the load . . . and flexible to reduce internal friction. It's unlike anything else on the market.

Grommets Grip Better

Straight sides bulge slightly when belt passes around pulley. This helps give belt its tremendous grip. In addition, grommet belts are more flexible. No need for stiffening plies of cord. This, too, adds gripping power. Size for size, grommet belts give ⅓ more gripping power than ordinary belts, pull heavier loads with a higher safety factor. And less slip means less surface wear.

Grommets Stretch Less



Since there is no dishing, there is more strength in proportion to cord volume — and less stretch. Grommet belts stretch an average of two thirds less than ordinary belts . . . yet withstand shock.

No Dishing with Grommets

Each grommet carries its fair share of the load. In ordinary belts the center cords "dish" under high tension. Dished cords do less work. Grommet belts have no cords in the center of the belt.

3 WAY SAVINGS!

Here's how you save with TEXROPE grommet V-belts:

1. **Grommet belts cut costs — belts are constructed for long life.**
2. **Grommet belts reduce downtime — machines run with few stops.**
3. **Grommet belts cut maintenance — few man hours are spent making unnecessary belt changes.**

Grommets Cost No More. *Texrope* grommet belts cost the same as ordinary belts of the same rating. The savings you make are clear profit.

Grommet belts are made in C, D and E sections. They were developed as a result of cooperative research of Allis-Chalmers and B. F. Goodrich and are made under B. F. Goodrich patent.

Call your nearby Allis-Chalmers distributor or District Office for a set of long life grommet V-belts, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3940

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

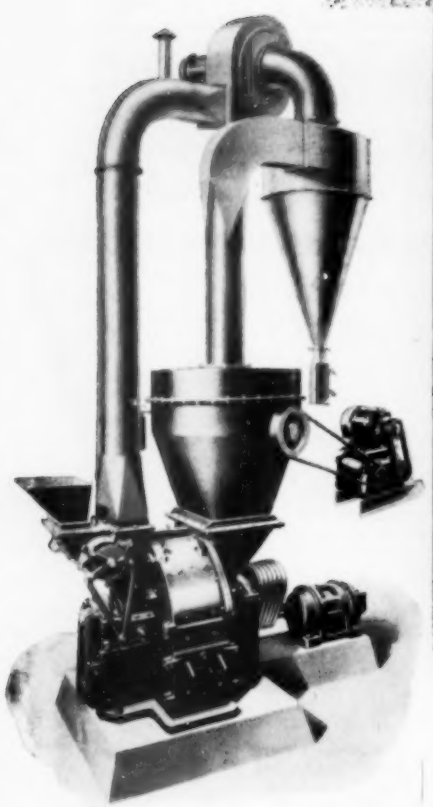
Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.



KAOLIN FILLERS CERAMIC CLAYS COATINGS

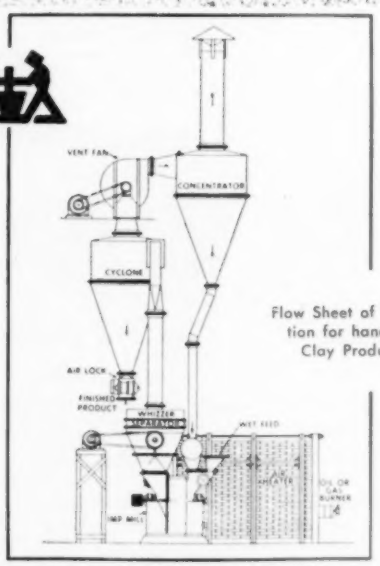
Grinding High-Moisture CLAYS with the Flash-Drying-Equipped IMP MILL

BALL AND SAGGER CLAYS MOULDING CLAYS FILTER CLAYS

THE problem of removing moisture while pulverizing various types of wet clay is economically answered by the Raymond IMP MILL, equipped with Flash Drying accessories. This compact mill system combines the entire operation of drying, grinding and classifying in a single unit of equipment.

In a typical installation, the crude clay containing approximately 25% moisture is fed directly to the mill after going through a cutter to break it down to satisfactory feed size. The mill system then produces a dry uniform finished product testing 99% passing 325 mesh with a final moisture of 3% or less.

This is a clean, automatic operation requiring a minimum of floor space, as there are no separate dryers or conveyors necessary. Product quality is easily controlled in fineness and dryness. One simple adjustment of the Whizzer Separator provides instant regulation over a wide range of fineness, while automatic temperature controls maintain a constant final moisture.



Flow Sheet of Operation for handling Clay Products

Write for Raymond IMP MILL Catalog No. 67, which describes applications of Flash Drying and Fine Grinding.

COMBUSTION ENGINEERING – SUPERHEATER, INC.

1307 NORTH BRANCH ST.,
CHICAGO 22, ILLINOIS

Raymond
PULVERIZER DIVISION

SALES OFFICES IN
PRINCIPAL CITIES

The JOY Champion sets absolutely new standards in blast-hole drilling. Months of operation in field after field have proved that it drills many times faster, and at far lower cost per foot, than any other drill on the market. Here's why . . .

REVOLUTIONARY DESIGN: The Champion Drill continuously pressure-cuts the rock with a rotating, tri-cone roller bit. It operates quietly, no deafening hammer strokes.

DRILLS DRY: No water-line or cold-weather freezing problems. Cuttings are instantaneously removed by an air-blast, and trapped and collected. The bit is always working on virgin rock, and even in dense, dolomitic limestone, bit life is exceptionally long.

NO LOST HOLES: Rigid drilling stem, plus controllable feed-pressure and rotation speed, prevent bit wander in bad ground—you finish every hole you start.

EASILY LOADED HOLES: The Joy Champion drills smooth-walled vertical holes, 5⅝" to 7⅞" dia., to any normal depth desired and as straight as a gun barrel. They load easier and safer, and give better blasting results.

Built in two models—the Joy Heavyweight and Middleweight Champions—each with choice of diesel or electric drive. ● Send us samples of *your* rock for a performance estimate.

ONLY JOY builds the CHAMPION BLAST HOLE DRILL

Consult a Joy Engineer

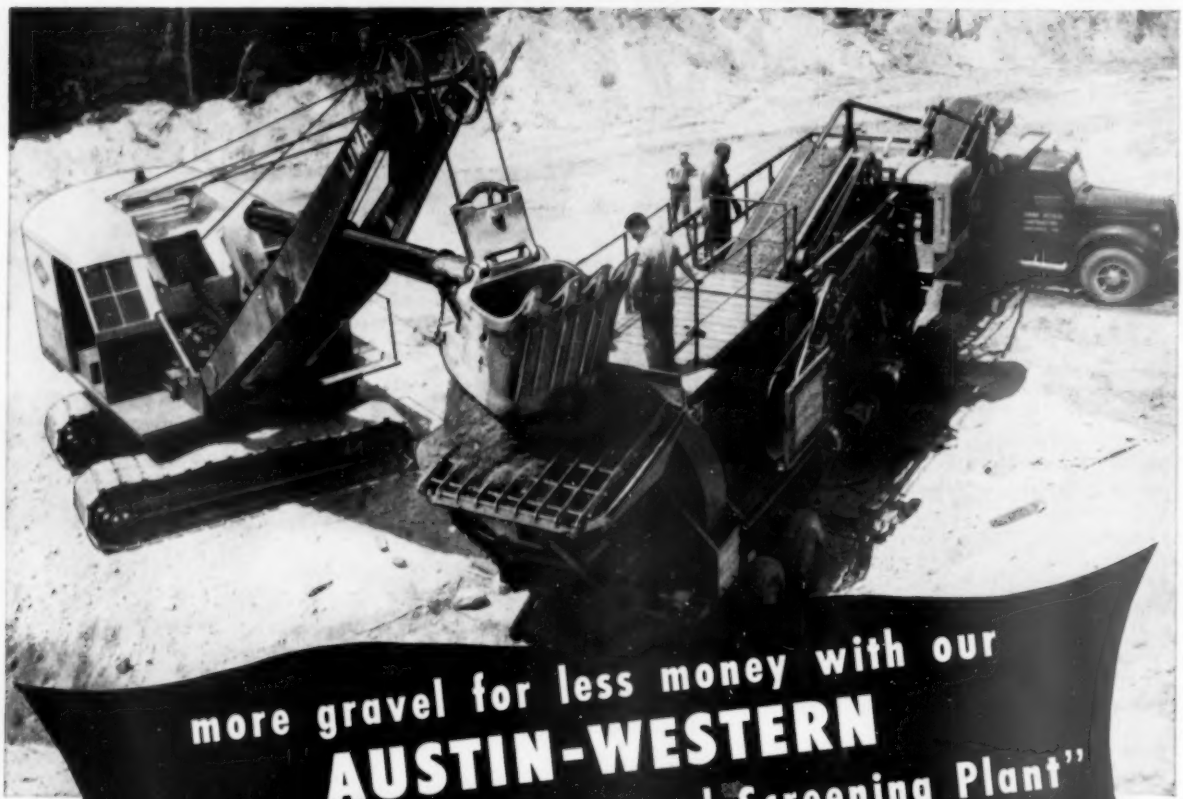
100 YEARS OF ENGINEERING LEADERSHIP

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

"WHEN REBUILDING THE ROOSEVELT TRAIL WE GOT



more gravel for less money with our AUSTIN-WESTERN '201' Portable Crushing and Screening Plant"

. . . says contractor Frank Rossi of Gardiner, Maine

"Thanks to our Austin-Western '201' crusher we made our own surfacing material for this new highway . . . cutting time and costs by crushing and screening gravel right on the job."

Such reports are not surprising, because this Austin-Western '201' portable crushing and screening plant is really tops. It excells in high production and low operating cost, because of these advantages

Easily portable with high output capacity. Fed by either shovel-loading hopper or feed conveyor. Extra-large screening capacity. Shaft and V-belt drives for all principal units. Anti-friction bearings. Large, oversize conveyors. Simplified design and fewer moving parts for low cost maintenance.

There are Austin-Western crushing plants for any requirement you might have . . . small portable units with single crusher and screen, multiple portable units, or stationary crushing and washing plants. We have just the plant to fit your requirements . . . each basically designed and engineered to give you maximum production at minimum cost.

Note: Austin-Western crushers are now being engineered and manufactured in Lima, Ohio enabling us to maintain steady, top-quality production of crushers.

Austin-Western
CRUSHING, SCREENING and WASHING EQUIPMENT

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

Workhorse SECO's ON THE JOB

at Shippingport Sand & Gravel Company, Shippingport, Penna.

WELL KNOWN PRODUCER MAKING BIG TONNAGES OF GRAVEL SIZED RIGHT TO MEET PENNA. SPECS.

Meeting state and other specs. to a T is an important reason why Shippingport Sand and Gravel Company enjoys such a fine reputation with their many customers. At the modern Shippingport, Penna. plant of Shippingport Sand and Gravel Company of Youngstown, Ohio, these Seco vibrating screens are winning the acclaim of the operators for accurate sizing and big production. These rugged screening workhorses (one 5 x 10′ single deck scalper and two 5 x 10′ double deck Seco's) take the load effortlessly and efficiently to produce a number of sizes including Penna. shot, Penna. 1B, Penna. 2B and minus ⅛" sand. Whatever specs. your sizes have to meet, regardless of the number of sizes, it will pay you to investigate Seco vibrating screens for your job. Send for Catalog No. 203.

SECO

TRUE CIRCULAR ACTION

VIBRATING SCREENS

Over 350 models to meet every need from scalping to final sizing.

Seco specializes in vibrating screens. Send your problems for prompt, personalized recommendations. No obligation.

SCREEN EQUIPMENT Co. Inc.
1750 Walden Ave., Buffalo 25, N. Y.
In Canada:
United Steel Corp., Toronto, Ontario

FACTS YOU SHOULD KNOW

to Assure Efficient Direct-Firing of Rotary Kilns

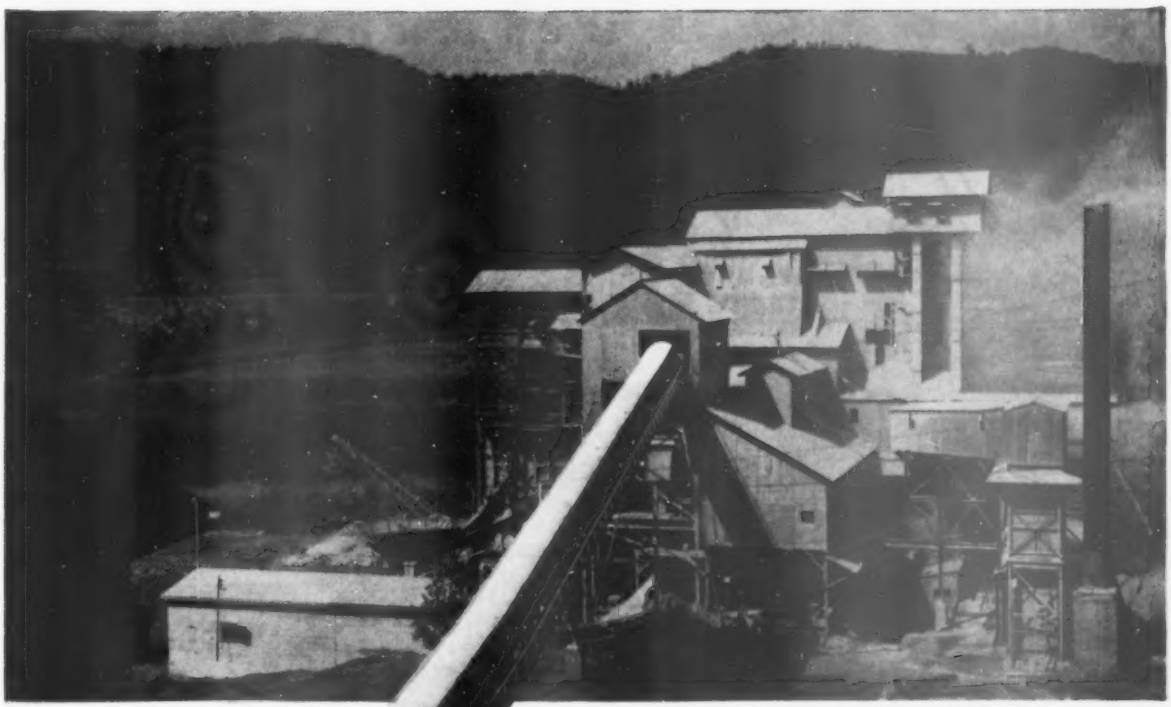
Costs of achieving maximum capacity and high-quality product from your rotary kilns are largely dependent on the efficiency and dependability of your direct firing system.

B&W Direct-Firing Systems are designed to the exacting demands of each individual application . . . are available in eighteen sizes, with capacities ranging from ¼ ton to 15 tons of coal per hour.

For complete facts about this efficient and compact B&W Unit which can be interpreted in relation to your requirements, write for Bulletin C-12, The Babcock & Wilcox Company, Boiler Div., Process Equipment Dept., 161 East 42nd Street, New York 17, N. Y.

C-202

BABCOCK & WILCOX



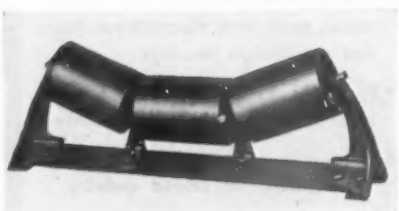
THIS JEFFREY BELT CONVEYOR

Effects Marked Modernization In This Large Limestone Plant

It conveys crushed limestone (1¼"-0") up a 60-foot incline at 125 tons per hour. 500-foot center, this conveyor runs at 227 F.P.M. — 30 H. P. motor. Provides continuous operation with little maintenance.

Jeffrey engineers are constantly effecting marked modernization of material handling methods in the many fields Jeffrey is privileged to serve. It's a story of specialization . . . of painstaking "care" which has constantly attended the development of Jeffrey equipment.

Also on this job are Jeffrey Spiral Conveyors, Bucket Elevators, Feeders and allied machinery. Our engineers are in a position to help you satisfy each new demand in a practical manner. Write today.



One of the Jeffrey 3-roll Belt Idlers, mainstay of the Belt Conveyor system. They are rugged and built to give years of reliable service. Various sizes for the job at hand.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

6-TON CRANE

for less than

$6300.00!*

...the new Model T-35 BANTAM®

*Price includes complete 6-ton crane unit with std. 25' boom, 12" block, 2 part line and extra cwt. FOB Waverly, Iowa. Truck and mounting charge extra. (Price subject to change)

Owners of over 3500 Schield Bantam shovel-cranes will tell you that the famous M-49 Bantam was "the finest machine in its class . . . unequaled in all-around performance and low maintenance cost." BUT wait 'till you see the husky new Bantam T-35! You get *20% more lifting capacity, plus a host of advanced operating improvements . . . still at the lowest price in the industry!* How can Schield Bantam do it, you ask? Simply because we specialize in building *only one size* shovel-crane . . . and because we build *more of them* than anyone else, we are able to give you a constantly *better machine, at a lower price.* For convincing proof, ask your Schield Bantam Distributor for a T-35 demonstration, or write today for *free descriptive literature,* containing full information.

Get these T-35 *plus* features!

- Power boom hoist standard at no extra cost — for extra precision.
- Rigidly mounted on special Bantam crane carrier, or any std. tandem, or heavy-duty single axle truck. Trucks promptly available through factory or local Bantam Distributors.
- Quality engineered for full power advantages, with machine cut gears and anti-friction bearings.
- Ruggedly constructed with extra-large clutches, shafts and brakes.
- Extra-wide trunnion base, plus 4 hook rollers, for added stability.
- QUICKLY CONVERTED to dragline, clam, backhoe, shovel, magnet, grapple, or pile driver for extra income.

SB-CR-22

SCHIELD **Bantam Co.**

216 Park St., Waverly, Iowa, U. S. A.

World's largest producer of truck-mounted cranes and excavators

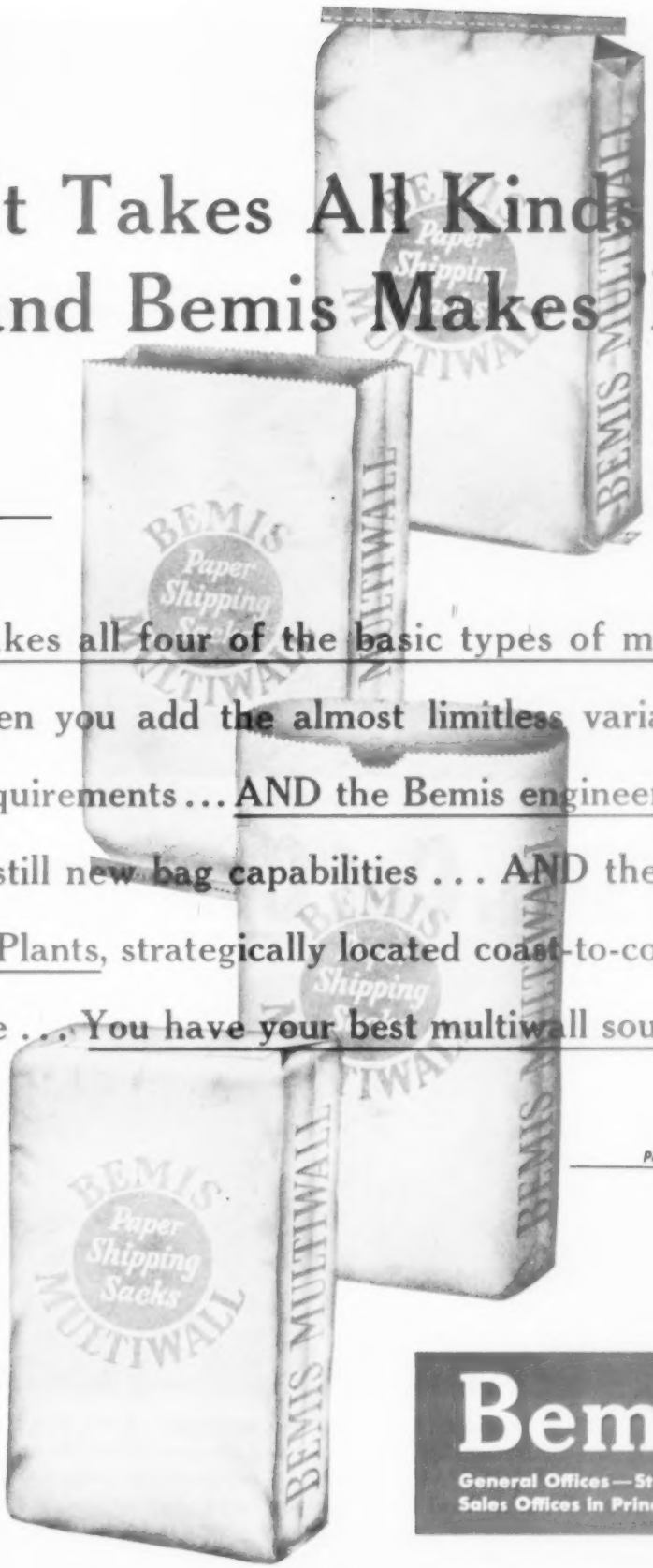
T-35 DRAGLINE excavates 90 cu. yds. per hr. Simplifies loading trucks, feeding crushers . . . ideal tool for digging basements, drainage ditches, stock ponds, etc.

T-35 BACKHOE digs 100' of 5' trench per hr. . . . has fast-change hoist and backfill attachments for handling complete pipe or tank installations with same rig.

T-35 CLAMSHELL handles gravel and bulk materials at 80 cu. yds. per hr . . . makes extra money digging trenches, footings . . . handles debris, scrap, etc.

T-35 SHOVEL gives you 90 cu. yds. per hr. production with automatic cable crowd. Saves time working roadside pits, handling road repairs, general clean-up.

It Takes All Kinds...
and Bemis Makes 'Em



Sewn Valve

Sewn Open Mouth

Bemis makes all four of the basic types of multiwall paper bags. When you add the almost limitless variations to meet special requirements... AND the Bemis engineering know-how to create still new bag capabilities ... AND the twelve Bemis Multiwall Plants, strategically located coast-to-coast to give you top service ... You have your best multiwall source ...

Pasted Open Mouth

Pasted Valve

Bemis

BEMIS BRO BAG COMPANY

General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

How Allis-Chalmers MOTOR SCRAPERS Help Cut Cost per Yard

Positive, forced ejection . . . eliminates wasteful circling or other time-consuming methods of removing the load. Allis-Chalmers' patented forced-ejection system plus high apron lift *bulldozes* dirt out of the bowl fast every trip . . . without extra wear and tear on power control unit cables and clutches.

Easy operation. From foam rubber seat to finger-tip control, shock-free hydraulic steering and full visibility, a TS-300 operator has every available help for safe, sure, speedy work. Balanced weight distribution and low center of gravity make A-C MOTOR SCRAPERS easy to maneuver even at top speed.

Faster, easier loading . . . because A-C MOTOR SCRAPERS have up to 20 hp. to handle every struck yard . . . plus offset cutting edges and "center-boiling" loading action that spills the dirt evenly, filling corner voids for full capacity loads.

High-speed hauling. The power behind the TS-300 teams up with big, traction-type tires that gear it to the road . . . move capacity loads at 22.5 mph. And operating clearance of 20 in. helps keep it from hanging up on rutted haul roads.

by Cutting Time per Yard

A dirt-moving "package" that makes every second count. The powerful HD-20 torque converter tractor is an ideal teammate for the TS-300. It synchronizes to scraper speed at contact . . . automatically loads at fastest speed conditions permit with less strain on operator and equipment . . . gives scraper an extra fast start to the fill.

Your nearby A-C dealer will be glad to give you more yardage-boosting facts about job-tested, *job-proved* MOTOR SCRAPERS. He can also tell you where you can see them at work and talk to the men who own and operate them. You owe it to yourself to call or stop in soon.

TS-300 MOTOR SCRAPER	TS-200 MOTOR SCRAPER
14 cu. yd. struck capacity	10 cu. yd. struck capacity
18 cu. yd. heaped capacity	13 cu. yd. heaped capacity
280 hp. Buda diesel or	176 hp. Buda diesel or
275 hp. Cummins diesel	165 hp. Cummins diesel

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

A-C THE FINEST LINE ON EARTH

Step up YOUR PRODUCTION with

MORE and MORE, the call is for bigger loads and faster schedules in the busy, growing construction industry.

You can count on White six wheelers to keep moving at record pace on the big pouring jobs. Rugged and dependable, Whites are tailored right to the exact work conditions, for more work...longer life.

Your White Representative will tell you how *you* can use White Six Wheelers in your business...to *extra* advantage.

WHITE SIX WHEELERS

Stewart Sand & Material Co. Keeps Whites Rolling

Here is a husky White Six Wheeler ready to roll at one of the Stewart Sand & Gravel concrete plants, Kansas City, Mo. Rough going in this business—but Whites have the power ...the stamina...the dependability that makes them the choice of leaders in the industry ...everywhere.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

White

For more than 50 years the greatest name in trucks

Nothing too rough or tough for Thermoid Conveyor Belting

Thermoid's long experience and continuing research *in the field*, pays off with real economy, maximum efficiency and greater tonnage for your belting dollar. Regardless of the size or kind of material—light or heavy, soft or abrasive, hot or cold, wet or dry—whatever the job, it's a good bet that Thermoid has solved the same or a similar problem with a belt that will do the job better.

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Get in touch with your Thermoid distributor or write direct for a copy of the Thermoid Conveyor Belting Catalog No. 3679.

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Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

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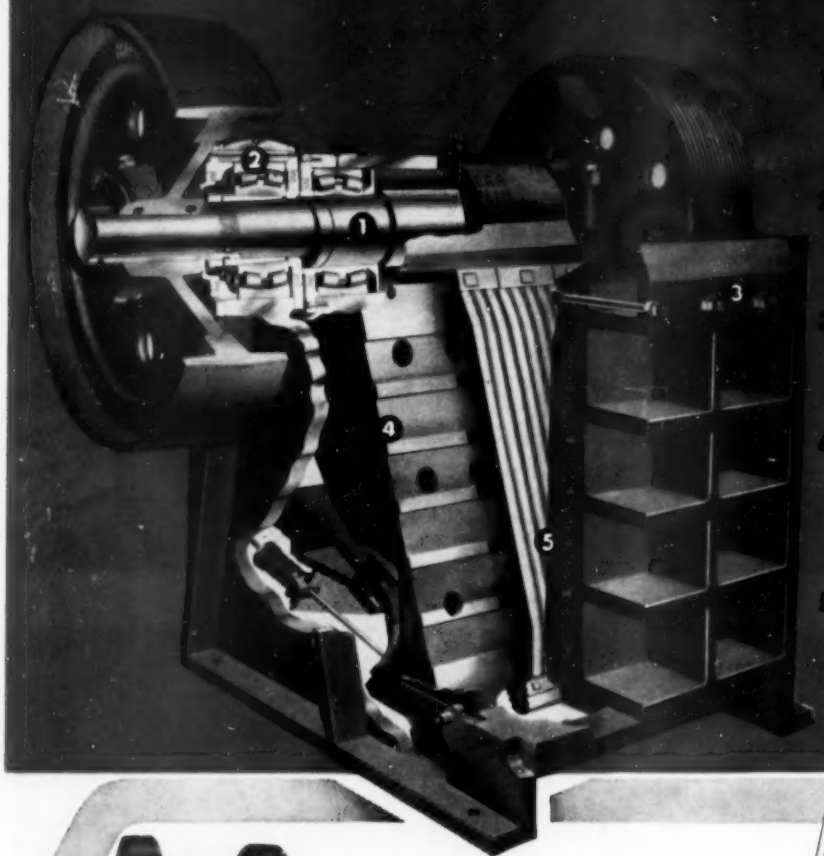
YOU CAN RELY ON ROGERS



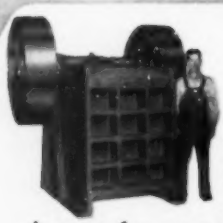
1. Extra heavy shaft forged from nickel alloy steel, accurately machined. Eccentric supports the pitman in a forward and downward motion, crushing and forcing material through the crusher.

2. Double row, self-aligning spherical roller bearings are mounted and closely spaced to prevent any possibility of eccentric shaft oscillation. Easily adjustable and removable without special tools.

3. Extra heavy, electric welded steel frame. Side plates machined to receive tapered horizontal members before welding. Heavy external ribs welded in place to reinforce frame at points of maximum stress.

4. Heavy box section pitman is made of electric furnace cast steel. The casting is double annealed to avoid any possibility of internal cooling stresses. Bearing fits are machined in one operation. Replaceable jaw toe prevents wear on the lower retaining lip of the pitman casting.

5. Jaw plates and cheek plates of high quality austenitic manganese steel. Jaw plates are reversible, plain or corrugated, furnished with straight face, curved non-choking face, or modified non-choking face. Wedged in place, easily replaceable.



ROGERS JOPLIN

Here, in cut-away view, are the rugged insides of a ROGERS jaw crusher. The design, the materials, and the construction methods are the result of fifty years of crusher-building experience. In world-wide use, the ROGERS jaw crusher is known for smoothness and reliability where the going is the toughest. You can't buy a tougher, more reliable jaw crusher than ROGERS!

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Joplin, Missouri

Please send Bulletin 52-1 on Jaw Crushers

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*Editor's page.....

Supreme Court Ruling on Federal Wage and Hour Law

ON MARCH 9, 1953, THE UNITED STATES SUPREME COURT decided by a vote of seven to two that Alstate Construction Co., producer of amiesite road-surfacing material in Pennsylvania, is engaged in interstate commerce. This decision means that employes who prepare such materials for the repair of interstate highways are covered by the Wage and Hour Law, despite the fact that the product does not move across state lines.

This case is one of two that had been brought before the highest court to test the authority of the Wage and Hour Division to apply the law to employes engaged in producing materials off the site.

This final decision, which rules that such construction materials need not be moved physically out of the state of origin in order for the overtime provisions of the law to apply, could portend or actually be a set-back in the case of producers of aggregates and other construction materials produced locally for movement only within the state of production.

As this is written, the official wording of the Court's ruling was not yet available, so the question remains as to whether the decision was on the Alstate case alone or covered others as well. This particular case was peculiar in that the plants involved prepared an asphaltic mix used in the repair of interstate highways. Unless the die is already cast to the contrary as we attempt comment on the decision, it may be that those employes in the quarry preparing the ingredients might be ruled as in a different class than if the final product was ordinary aggregates.

Industry's Case

At any rate, this was the case with which the National Sand and Gravel Association became prominently identified in hearings before the Court, having filed a brief in support of petitions before the Court to reverse a decision which had been handed down earlier against Alstate Construction Co. Earlier, a district court and an appeals court had held that the highly controversial Wage and Hour Law applies to "off-the-road" employes engaged in the production of amiesite for the repair and maintenance of interstate highways. The ruling to come in this case was considered to be of vital concern to aggregates producers.

After enactment of the law in 1938 and until 1945, the ruling had been that employes in aggregates plants were covered only when the materials produced crossed state lines. Then came the Walling ruling which reversed the earlier interpretation and which, in effect, removed the distinction between interstate and intrastate commerce.

It is this interpretation which the National Sand and Gravel Association has contended as not being the intent of Congress as the original law was written and which it has fought vigorously in the interests of aggregates producers.

The brief filed by the association presented a strong case built around past interpretations and rulings. Certainly the documentary evidence as accumulated revealed that the law was highly controversial and provocative of decisions that were so contradictory that an amendment clarifying the law's provisions would seem the only practical solution for those who are penalized by interpretations that do not appear to be the original intent.

Interpretation's Effects

We assume, in the Alstate case, that the highest Court upheld the earlier decisions that, for the period in question, employes who spend a substantial part of the work week in producing goods for interstate commerce were entitled to full benefit of the law.

The matter of wages to be paid for such workers, in localized construction materials industries, is not by itself the most important issue. With the exception of possibly some few areas, it is likely that the minimum wage scale of seventy-five cents per hour is being met. There may, however, be innocent violations of the time and one-half requirement for work in excess of forty hours a week and such producers may be subject to penalties because the law's applications have been so vague.

One thing is certain and that is that employers will have to determine responsibility for compliance within every work week. The amount of record-keeping and paper work that would be required, in itself could be tremendous.

Irrespective of the aggregates industries, the import of the Alstate decision is brought out by predictions of the extent of highway building and reconstruction forecast for the years ahead. An estimated one and one-half billion dollars is expected to be spent for maintenance of highways alone in 1953. It is in work on existing instrumentalities of commerce that the law applies.

Bror Nordberg

Photo courtesy Marlow Pumps, Ridgewood, New Jersey

nearly 25% more water with Chrysler Industrial Power

Too seldom does Mother Nature supply moisture in the right proportion for maximum realization of the good things of the soil. This problem is not confined to the so-called "dry" or "arid" regions of the country. For instance, here's a field of beans in upper New York State. This farmer, like many other farmers and growers, has found that a sprinkler system fed by a Chrysler-powered pump provides the supplemental irrigation necessary for best growth.

The Marlow Pump in use here is designed for high capacity pumping. For that reason, the powerful new 180 horsepower, 331 cubic inch displacement Model 20 Chrysler V-8 Industrial Engine was selected to power it. Result: nearly twenty-five percent more water than delivered by pumps powered by engines of similar weight and displacement, *without* sacrificing fuel economy.

This is another fine example of how Chrysler meets the many and varied requirements for industrial power. For instance, Chrysler can equip any of its engines with a corrosion-resistant or fungus-treated electrical system; propane or natural gas burning carburetor; 3, 4 or 5 speed transmission; standard or gyrol Fluid Drive.

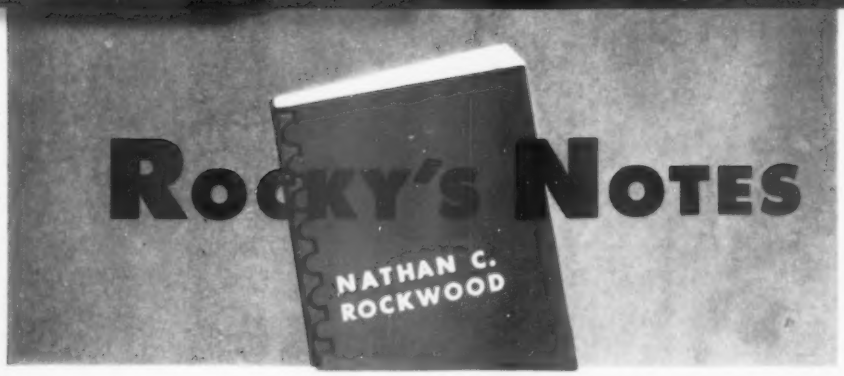
Chrysler Industrial Power is not expensive. Production-line methods adapted to specialized industrial engine building provide a custom-built engine at mass-production prices.

For your power needs, see a Chrysler Industrial Engine dealer or write us direct: ***Department 133, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER

Industrial Engines

HORSEPOWER WITH A PEDIGREE



Candid Comments on Cement and Concrete

WE EXPECT SOME COMMENTS we are about to set down will make a few of our concrete research friends a little sore, but perhaps they haven't much sympathy with our aims and purposes anyhow. Our experience seems to have led us to the belief the specialists in some one branch of science are inclined to be jealous of their special knowledge and rather contemptuous of any attempts of a layman to understand or expound any theories that may run contrary to their special expert knowledge. All of which is quite human and understandable, and not resented.

Yet we often wonder just how a portland cement manufacturer, who like us is not a science specialist, whose experience goes back 35 or 40 years, evaluates the several million dollars' worth of research work that has been done by a host of volunteers to "improve" his product and its uses. It seems to us, as one familiar with the current engineering literature of 40 and more years ago, that engineers have, if anything, less confidence in the stability of concrete than they had then. Maybe it was a case where ignorance was bliss, but that blissful ignorance did result in many entirely satisfactory structures, without the worry that present-day builders exhibit, such for example as the Panama Canal locks and dams, and some of the early U.S. Reclamation Service structures.

What satisfaction is it to a present-day portland cement manufacturer to be told that entrained air is the best answer to good concrete? The time was when good cement was the apparent answer, the more used the better. Now the manufacturer is told that air—that is nothing at all—in the concrete is better than the equivalent amount of cement. The cement manufacturer, at the instigation of the experts, was persuaded that the only really useful ingredients in his product were tri-calcium and di-calcium silicates, and of these two the tri-calcium silicate was best.

He went to great additional expense to make more tri-calcium silicate by adding lime to his product, more fuel for harder firing, more power for finer grinding of the raw materials and finished product. Now he is told by some of his most important customers that this modern cement isn't much good for durable structures unless a California burned shale, fly ash, or some other pozzolanic admixture is used with the cement. And the user proves his point by paying a much higher delivered price for the admixture than for the cement.

Ingredient Left Out

Just what is his customer doing? He is simply adding an active silica and alumina ingredient (and probably alkalies as well) that the experts through the years persuaded the cement manufacturer to reduce below the safe requirement for stability or durability of the concrete. Even today, the same or better results probably could be obtained by research directed to that end with a cement in which the necessary silica and alumina ingredients, properly processed, were part of the process of manufacture, instead of as an admixture, or after-thought. It is obviously a case where the customer "expert," having misled the manufacturer into making a product which is now recognized as too "saturated" with lime, is attempting to correct his error without admission of his fault.

Certainly, as the experts say, we shall never go back to the "old-fashioned" portland cements; we must utilize the gains made, but is it sound policy never to recognize that those old-fashioned cements had any virtues? To do so would be to admit that at some stages of our progress we have been off on tangents; but is that a fatal admission? Or is it more in keeping with the scientific progress of the age to correct the few faults of our modern cements with (nothing) entrained air, fly ash or some other patent medicine?

Fearful and Complicated Product

Portland cement clinker has become a fearful and complicated product, which none but the experts should even attempt to understand or explain. Obviously, its nature is beyond the comprehension of the layman. Therefore, what is the harm in letting the engineer researcher go stumbling on acquiring experimental data and experience with respect to cement and concrete that he can't explain, but seems to derive some kind of satisfaction from telling about?

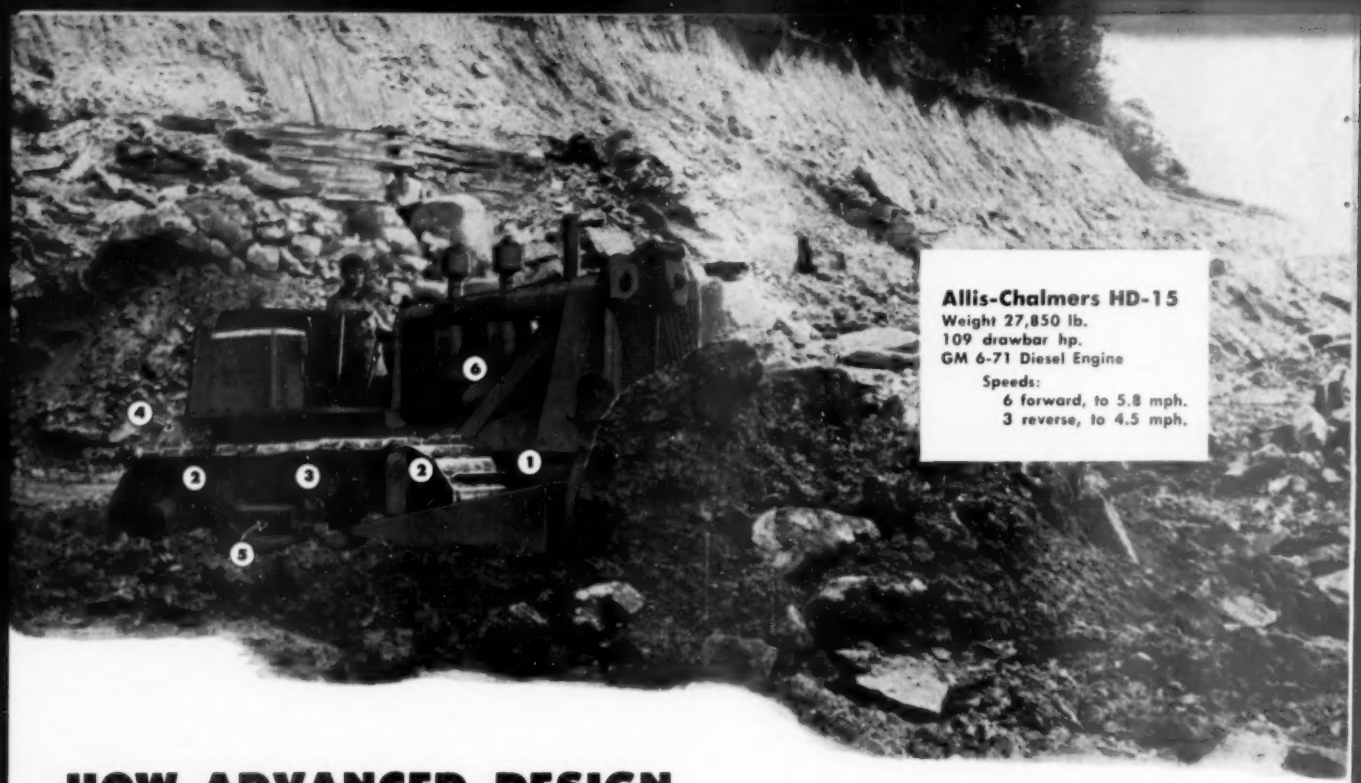
It never seemed to us, in our abysmal ignorance, that it makes a whole lot of difference what are all the combinations of calcium, aluminum, silica, et al, in clinker. Whatever they are they don't last long when water is added to the pulverized clinker. When that is accomplished we get some colloidal products of these elements which combine in new ways, and incidentally with altogether too much water, according to accepted concrete practice. The result is that we often do not get stable products, and the rearrangements of the elements start at once and continue to the eventual disintegration of the whole mass—as any geochemist could have predicted.

The instability of the clinker under moist conditions is due to the excess of lime. It is immaterial just what the chemical formulas are—that is so far as the ultimate product is concerned. From a mechanistic point of view it is easily understood, when one appreciates that the *acidity* of silica and alumina increases with a rise in temperature. Thus, at the temperature of a rotary cement kiln the acidity of the silica and alumina is so great that they will seize or absorb a great deal more (alkaline) lime than the same silica and alumina would react within a solution or otherwise at lower temperatures. These high temperature combinations are retained when the product is frozen or cooled rapidly, as cement clinker is. Water, when it can get to these "frozen" particles, as it does when the product is finely ground, releases the temporary high-temperature combinations, and solutions of the ingredients (both real and colloidal solutions) result.

It does not make a great deal of difference from our point of view whether we say, "according to Hoyle", that the tri-calcium and di-calcium silicates hydrate, or that the *lime part* of the particle hydrates, the end results are the same—which are silica, alumina, lime, et al, in ionic and colloidal solution. The stiffening, hardening and final set of the cement paste are not phenomena peculiar to portland cement, but to all gels made up primarily of silica and alumina. The same reaction takes place in mixtures of lime and a pozzolan, in hydraulic limes, natural cements, etc.

The chief advantage of portland cement clinker over mixtures of lime and pozzolan is that it is a more intimate combination or mixture, and therefore reacts or disintegrates faster in water. As everyone knows, it reacts so fast that it is necessary to use an appreciable percentage of gypsum "retarder." Yet, instead of aiming at a cement composition that gives the proper timing for reaction, the tendency has been to make compositions that speed up the reactions and then slow them down again by the use of more and more gypsum. It would seem to the uninitiated that it would be more logical to start with

(Continued on page 136)



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These heavy-duty tractors have toughness and ease of servicing to match their outstanding performance ability. Here are some of the advanced design features that provide extra strength and protection — keep Allis-Chalmers tractors on the job more hours:

1. One-Piece, All-Welded Structural Main Frame . . . strong and firm without a single ounce of excess weight — absorbs all vertical and horizontal stresses.

2. Extra Large Idler and Sprocket eliminates rocking action, puts more track on the ground for greater stability and better traction.

3. Spring-Loaded, Positive Seal keeps dirt, moisture and grime from damaging truck wheels, idlers and support rollers . . . you lubricate them only once every 1,000 hours.

4. All-Steel, Welded A-Frame Track Stabilizer permits free track oscillation, yet keeps tracks rigidly in line and absorbs thrusts and twists from shock loads and working on uneven terrain.

5. Oil Enclosed Track Release Mechanism reduces track maintenance and breakage. An adjustable screw lock provides positive holding action that maintains adjustment at required setting.

6. Engine Not Used as Structural Member — no strain is transmitted to it. Engine weighs less per horsepower developed, because of 2-cycle design — has modern unit injection.

UNIT CONSTRUCTION SAVES SERVICE TIME

With Allis-Chalmers *unit construction*, major assemblies are easily removed without disturbing related assemblies. This brings real savings in time and money, puts tractors back to work faster. It assures better inspection and maintenance, too. Servicemen find it easy to remove major parts to correct trouble before damage develops.

Let your dealer tell you more about the toughness of Allis-Chalmers tractors, their time-saving unit construction — and their unequalled lugability and work power.

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LABOR RELATIONS TRENDS

Probable Changes in the Taft-Hartley Act

By NATHAN C. ROCKWOOD

BY THE TIME THIS IS PUBLISHED, hearings on proposed changes in the Taft-Hartley (Labor-Management Relations) Act will be underway, or possibly completed. It is doubtful if final action will have been taken, as there appears to be the prospect of considerable debate in Congress. While conservative Southern Democrats and the Republicans will probably have their way, there is every indication that many of the Republicans will act with an eye on the 1954 Congressional elections, and will not be as forthright in meeting some issues as a 100 percent public interest seems to require.

Labor union bosses are already shouting that proposed changes, so far announced, are not adequate, although all of them are concessions to labor. Their objections to the law or any similar law will remain as long as any opportunities are provided for the individual members of the unions to get out from under the domination of labor-union bosses. What they seek, of course, is for the government to compel union membership. Probably the recent election returns convinced them that their union members are getting too independent. They have dominated the national political scene too long to give up any advantage without a bitter struggle.

Proposed Taft Changes

Senator Robert A. Taft, of Ohio, one of the authors of the original act has submitted to the U.S. Senate five bills—S.655, S.656, S. 657, S.658 and S.659 designed to meet some of the objections to the present law by the labor union bosses. Some of the changes proposed are in detail as follows:

S.655 would strike out the second sentence of Section 9(c) (3). This section reads: "No election shall be directed in any bargaining unit or any subdivision within which, in the preceding twelve-month period, a valid election shall have been held. *Employes on strike who are not entitled to reinstatement shall not be eligible to vote.* In any election where none of the choices on the ballot receives a majority, a run-off shall be conducted, the ballot providing for a selection between the two choices receiving the largest and the second largest number of valid votes cast in the election." Most of the comment and "interpretation" of this amendment refers only to the giving a vote to strikers now excluded *(our italics above).*

Section 8 (d) would be amended by striking out the last sentence; this sentence is striken out to conform to the previous amendment: "Any employe who engages in a strike within the 60-day period specified in this subsection shall lose his status as an employe of the employer engaged in this particular labor dispute, for the purposes of sections 8, 9 and 10 of this act, as amended, but such loss of status for such employe shall terminate if and when he is reemployed by such employer."

Section 9(c) (1) would be amended by striking out so much of the next to the last sentence there of as appears after the last comma of such sentence. This section defines the method by which the National Labor Relations Board handles petitions for bargaining group elections. The sentence referred to above reads: "Such hearing may be conducted by an officer or employe of the regional office, *who shall not make any recommendations with respect there to* (our italics). This, of course, is designed to permit the hearing officer to make a recommendation.

Anti-Communist Changes

Section 9 (h) would be rewritten as follows (this revision is important):

"(h) (1) No petition made by a labor organization under section 9 (c), and no charge made by a labor organization under section 10 (b) shall be entertained unless there is on file with the Board an affidavit executed contemporaneously or within the preceding twelve-month period by each officer of such labor organization and the officers of any national or international labor organization of which it is an affiliate or constituent unit, that he is not a member of the Communist Party or affiliated with such party, and that he does not believe in, and is not a member of or supports any organization that believes in or teaches, the overthrow of the United States Government by force or by any illegal or unconstitutional methods or seeking by force or violence to deny other persons their rights, under the Constitution of the United States. The provisions of section 1001 of title 18 of the United States Code shall be applicable in respect to such affidavits. For the purposes of this subsection "officer" means members of all policy-forming and governing bodies of the labor organization as well as those designated as such by the constitution of the labor organization.

"(2) No petition made by an employer under section 9 (c) and no charge made by an employer under section 10 (b) shall be entertained unless there is on file with the Board an affidavit executed contemporaneously or within the preceding twelve-month period by such employer, its officers if it is a corporation, and each of such employer's agents having responsibility for the employer's labor relations that he is not a member of the Communist Party or affiliated with such party, and that he does not believe in, and is not a member of or supports any organization that believes in or teaches, the overthrow of the United States Government by force or by any illegal or unconstitutional methods, or seeking by force or violence to deny other persons their rights under the Constitution of the United States. The provisions of section 1001 of title 18 of the United States Code shall be applicable in respect to such affidavits."

This is new to the extent of including employers in the anti-communistic oath, but labor union bosses are said to object to their part as covering too much ground.

Section 10 (1) would be striken out of the Act entirely. This is the section of the law aimed at "prevention of unfair labor practices"; it prescribes the methods by which the N.L.R.B. is to enforce its orders by court injunctions in secondary boycott and jurisdictional disputes. The part eliminated reads: "(1) Whenever it is charged that any person has engaged in an unfair labor practice . . . . the preliminary investigation of such charge shall be made forthwith and given priority over all other cases except cases of like character in the office where it is filed or to which it is referred. . . . ." In other words the N.L.R.B. would no longer be *required* to seek injunctions in such cases.

Secondary Boycotts

Section 8 (b) (4) of the law would be amended by striking out the semicolon at the end of paragraph (A) and inserting a colon and the following: "Provided, That nothing in (A) of this section shall be construed to make it an unfair labor practice for a labor organization to induce or encourage employes to engage in a concerted refusal to perform work which because of a current labor dispute between another employer and his employes is, for the duration of such dispute, no longer being performed by the employes of such other employer;".

This section is the one which defines secondary boycotts, and para-

(Continued on page 134)

HERE'S PROOF RIGHT IN YOUR OWN QUARRY THAT YOU CAN CUT COSTS 4 WAYS

Yes, you can see DETONITE in action right at your quarry. Prove to yourself that DETONITE cuts your costs in these four important ways:

1. BLASTING COST
KING DETONITE is a slow-detonating powder. Its slow, heaving, spreading action lifts and fully displaces the burden. High cost of secondary drilling and shooting is greatly reduced.

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KING DETONITE breaks up rock into sizes that permit shovels to dig efficiently at all times, thus reducing handling costs to a minimum.

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KING DETONITE's proper fragmentation means less wear and tear on expensive equipment . . . less cost for maintenance and replacement.

4. PROCESSING COST
KING DETONITE's proper fragmentation allows your crushers to operate at top capacity, thus lowering cost of processing the stone.

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SHOW ME how DETONITE will cut my costs 4 ways. Without obligation, have the King Representative get in touch with me to arrange for a DETONITE demonstration right at our quarry.

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THE KING POWDER CO., INC
CINCINNATI 1, OHIO
1878 *Seventy-five Years of Service* 1953

PEOPLE in the news

50 Years of Service!

CONGRATULATIOS TO Capt. A. B. Zahn, director and secretary of F. L. Smidth & Co., New York, N.Y., on completion of 50 years of service with the company. A luncheon and

Capt. A. B. Zahn

later a banquet were given him by company officials and fellow workers, at which he received many gifts to commemorate his 50th anniversary with the firm. Archie, as he is known to his many friends throughout the country, joined F. L. Smidth in 1903 and served in various capacities until 1917 when he was elected a director. Ten years later he was appointed assistant treasurer and in 1938 became secretary. He is also a director and secretary of F. L. Smidth & Co. of Canada, Ltd.

During his 50 years of experience, Archie has seen the cement industry grow from infancy to become one of the major industries of the world. A walking encyclopedia of the cement industry, he has stored in his memory a great many of the advancements in the manufacture and use of cement making equipment. He was inventor of the special "Figure 8" chain used in rotary kilns for heat recuperation.

Capt. Zahn is an ardent fisherman and game hunter. For years he has spent his vacations enjoying life in hunting and fishing camps and to this day enjoys his favorite pastimes. At his desk every day, there seems to be little change in his appearance or slowing down in his energy. Time has been good to him.

He has for many years been a member of the Sons of the Revolution and the Sons of the American Revolution, and has devoted considerable interest in affairs of these organizations.

We wish him many more years of active service!

Elected President

FRANK B. WARREN, formerly vice-president and general manager, has been elected president of The Bessemer Limestone and Cement Co., Youngstown, Ohio. He succeeds George C. Treat, who died recently. A native of Paw Paw, Ill., and an engineering graduate of the University of Illinois, Mr. Warren joined Bessemer in 1936 as vice-president in charge of sales. He is a veteran

Frank B. Warren

of World War I, and served in France and Germany as a 1st lieutenant in a field artillery unit.

Heads Mo-Kan Association

L. L. DAUGHERTY of Eternacrete Products, Inc., Kansas City, Kan., has been elected president of Mo-Kan Concrete Products Association, Kansas City, Mo. He was formerly vice-president and succeeds George W. Kulhavy of The Carter-Waters Corp., Kansas City, Mo., who becomes chairman of the executive committee. Gus Main of the Kansas City Concrete Pipe Co., was named vice-president; C. Ernest Swanson of the Concrete Building Units Co., secretary; and B. J. Asner of Asner Blocks and Building Materials, Inc., treasurer. Tip Brown, executive secretary, was named secretary-manager.

President and Treasurer

PAUL H. TOWNSEND was elected president and treasurer of Huron Portland Cement Co., Detroit, Mich., at the recent annual meeting of the board of directors. He succeeds Emory

Paul H. Townsend

M. Ford who was named chairman of the board. John B. Ford was elected vice-president and William W. Crapo was re-elected secretary. Mr. Townsend joined the company in 1919 as superintendent of the distributing plants and vessels. He became general manager in 1939 and was elected vice-president and general manager in 1942. He has been a director since 1944.

Born in Clermont, N.J., Mr. Townsend left school at the age of 15 and went to work in his father's boat shop. When he was 17 he took a teacher's examination and later won a scholarship to Hotchkiss School, Lakeville, Conn., after which he entered Yale University, graduating in the class of 1918. He enlisted in the U.S. Army when World War I broke out in April, 1917, and served in France as captain, Battery D, 315th Field Artillery. He was discharged from the Army in June, 1919, and three months later joined the Huron Portland Cement Co.

Heads Engineers

H. K. WEAVER, engineer in the Birmingham, Ala., office of the Portland Cement Association, Chicago, Ill., has been elected president of the Alabama Society of Professional Engineers.

Administrative Assistant

ARTHUR B. MOBLEY has been appointed engineer and administrative assistant to E. W. Bauman, managing director of the National Slag Associa-

Arthur B. Mobley

tion, Washington, D.C. Mr. Mobley served in the Navy for two years, after which he entered the University of Maryland, graduating in 1950 with a B.S. degree in civil engineering. He was associated with the Maryland State Roads Commission for two and one-half years, and most recently served as materials engineer for the Baltimore County Highway Department.

Marietta Officers

FRANK L. CHRISTY was named president and director of Marietta Concrete Corp., Marietta, Ohio, at the recent annual directors' meeting. Frank J. McCauley was named vice-president; C. B. Ross, vice-president and director in charge of the Baltimore plant; F. Leonard Christy, vice-president and director; R. Neil Christy, president and director; J. B. Ross, director and Baltimore plant manager; C. K. Smith, treasurer; and Charles D. Fogle, Sr., director. Other administrative offices filled are: Harold W. Miller, comptroller; Robert Christy, plant superintendent; and Vernon L. Gatewood, plant manager.

General Manager

HERBERT H. DICKEHUT, JR., has been appointed general manager of Texcrete Co., Corpus Christi, Texas, to succeed his father, H. H. Dickehut, Sr., who has been named special consultant for the concrete pipe divisions of Texas Industries, Inc. O. B. Kelly, formerly general manager of Builders Supply, Inc., Pharr, Texas, has been transferred to Corpus Christi as plant superintendent of the Texcrete plant.

Mr. Dickehut, Jr., was formerly plant manager of Acme Concrete Pipe Co., Inc., Corpus Christi, and prior to that was plant superintendent of Austin Concrete Works, Inc., Austin. During World War II he served in the South Pacific, Japan and China with the Sixth Marine Division.

Mr. Dickehut, Sr., before his association with Texas Industries, Inc., in 1952, was vice-president of Acme Concrete Pipe Co. and general manager of Austin Concrete Works. He has 24 years of experience in the concrete pipe business. He is a veteran of World War I, and a past director of the American Concrete Pipe Association.

Assistant Plant Manager

CHARLES F. COLLEY has retired as assistant plant manager at the Hannibal, Mo., plant of Universal Atlas Cement Co., New York, N.Y., after 37 years of service. Mike M. Henning, who has been process engineer at the plant, has been named to succeed Mr. Colley as assistant plant manager. Edmund L. Mengel, formerly assistant quarry general foreman, succeeds Mr. Henning as process engineer.

Mr. Colley, who graduated as a civil engineer from Tri-State College of Engineering, Angola, Ind., started at the Hannibal plant in 1916. He served in the U.S. Army from 1917 to 1919 and after his discharge as a 1st lieutenant of artillery returned to the Hannibal plant. In 1928 he was promoted to plant engineer. Three years later he was given additional duties as head of the industrial relations department and in 1947 was appointed assistant plant manager.

Mr. Henning is a graduate of the Missouri School of Mines and was associated with the American Rolling Mill Co., Huntington, W. Va., until his induction into the U.S. Army in 1944. He served until November, 1945, and joined the Hannibal plant in 1946 as practice engineer. Five years later he became process engineer.

Mr. Mengel started as an engineering trainee at the Hannibal plant in 1949, following his graduation from the Missouri School of Mines. He was assigned to the quarry department as assistant to the general foreman in 1951 and was promoted to assistant quarry general foreman in 1952. He served in the U.S. Army from 1953 to 1946 and was commissioned 1st lieutenant in the Army Corps of Engineers.

Re-elected President

MERRILL ALLEN has been re-elected president and general manager of the Watertown Cement Products Co., Watertown, S.D. Vince Halverson was re-elected first vice-president; Ed Atkinson, second vice-president, and H. C. Werner, secretary-treasurer. Lucile Allen, Art Mahnke and Albert Allen were elected to the board of directors.

Chairman of the Board

ARTHUR E. TULK has been elected chairman of the board of the Cleveland Quarries Co., Cleveland, Ohio, and placed in complete charge of the Sterling abrasives division. He was formerly president and will be succeeded in this position by William M. Jones, former vice-president and manager of the sandstone operations, who has also been made general manager of the quarries division. Arthur J. Schneider, general sales manager of the Sterling abrasives division, has been elected vice-president of the division. Announcement has also been made of the removal of the firm's general offices to Amherst, Ohio, and the merger of the Sterling grinding wheel division with the Sterling abrasives division.

Sales Manager

J. W. C. BOYKIN has been appointed sales manager of the Volunteer Portland Cement Co., Knoxville, Tenn. He succeeds Percy McKinney, who died last January 10. Mr. Boykin, formerly South Carolina representative, has been connected with the cement business for 15 years. Mr. McKinney had been with the firm about 28 years before his death and had served as sales manager for 11 years.

J. W. C. Boykin

District Engineer

RALPH E. SPEARS has been appointed district engineer of the Salt Lake City office of the Portland Cement Association, Chicago, Ill. He succeeds E. B. Wilson, who has resigned to enter business for himself in Oklahoma. A graduate of Iowa State College with a B.S. degree in architectural engineering, Mr. Spears joined the P.C.A. in 1948 as district structural engineer in the St. Louis office. Prior to that he was a structural engineer with an architectural firm in Kansas City, Mo.

Sales Managers

HERMAN LIEBREICH has been promoted to assistant manager of the Southwestern Portland Cement Co., El Paso, Texas. He was formerly sales manager and will be succeeded in this position by Thad A. Steele, who has been assistant sales manager. James C. Clary, formerly assistant to sales manager, succeeds Mr. Steele as assistant sales manager.

Mr. Liebreich was born in Monroe, La., and joined the company in 1920 as assistant timekeeper on construction. He was appointed assistant sales manager in 1929 and became sales manager in 1945.

Mr. Steele started with the company in 1936 as a salesman. Born in Pottsboro, Texas, he went to El Paso in 1928 to attend Texas Western College, graduating in 1932 with a B.A. degree. He entered the U.S. Navy as lieutenant (jg) in 1942 and was discharged as lieutenant commander in 1945. Returning to Southwestern Portland Cement Co., he was appointed assistant sales manager in 1946.

Mr. Clary, born in El Paso, Texas, joined the company in 1938, following graduation from A. & M. College of Texas. He served in World War II from 1941 to 1946, and was discharged as lieutenant colonel. He returned to Southwestern in 1946 as a salesman and was recalled to service in 1950 due to the Korean war and was discharged in 1952. Upon his return, he was appointed assistant to the sales manager.

Elected Vice-President

MYRON W. KRUEGER has been elected vice-president of the Raymond Concrete Pile Co., Youngstown, Ohio, in addition to his duties as treasurer. He is also a director of the company. Henry A. Federa, formerly secretary, general attorney and a director of the Orinoco Mining Co., a subsidiary of the U.S. Steel Corp., has been named secretary.

Merchandise Manager

E. R. GLENNON has been appointed merchandise manager of the plastering materials department of the United States Gypsum Co., Chicago, Ill. He has been with the company since 1925 and was formerly merchandise manager of the paint division.

Heads Silica Firm

P. GRANT FORMAN, formerly executive vice-president, has been elected president of the Industrial Silica Corp., Youngstown, Ohio. He succeeds Jacob S. Coxey, Jr., who has retired because of ill health, after 23 years of service with the company. Mr. Coxey continues as chairman of the board. Mr. Forman joined Industrial Silica Corp. in 1931 as works manager. He was elected vice-president in 1941 and ten years later became executive vice-president. Myron E. Ullman, who has been a member of the board of directors and legal counsel since the firm was organized, has been named vice-president. W. Glenn Bell, traffic manager, has been appointed manager of the order department to succeed Charles F. Eberhart, who has retired.

Assistant Manager

BYRON A. BLEDSOE has been promoted to assistant manager and engineer of the Atlanta, Ga., plant of Universal Concrete Pipe Co., Columbus, Ohio. A graduate of Tennessee University and the Yale University Bureau of Highway Traffic, Mr. Bledsoe joined the company in 1952 after serving with the Highway Research Board in Washington, D.C. C. Ray Wilhelm is manager of the Atlanta plant.

Byron A. Bledsoe

Executive Vice-President

JOHN D. WILSON, secretary-treasurer of the South Dakota Cement Plant, Rapid City, S.D., has been appointed executive vice-president of the Giant Portland Cement Co., Philadelphia, Penn. Mr. Wilson was also named a member of the board of directors, and will serve as president. He replaces John A. Philbrick who was killed last summer in a plane crash.

OBITUARIES

GEORGE E. CONNOLLY, vice-president of the Nichols Engineering and Research Corp., New York, N.Y., died suddenly at his home in New York City, October 17. He joined the company in 1943 as vice-president in charge of the industrial division. Mr. Connolly had a wide experience in the design, construction and operation of multiple hearth furnaces for use in metallurgical and chemical fields. He was granted many patents covering design, improvements of roasting, calcining and drying in multiple hearth furnaces. He was responsible for many adaptations of the Nichols Herreshoff and Bethlehem Wedge furnaces to accommodate special requirements, processes and materials in a wide variety of fields. He was also active in the field of industrial waste disposal, and in the use of the Herreshoff furnaces for reclamation of foundry sand, lime calcining and the Nichols flash roasters for production of SO_2 from pyrites. Born in New York City, Mr. Connolly attended school in San Francisco and the University of California at Berkeley.

WALTER LANDON MAXSON, formerly manager of the basic industries department of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., died January 8 in Bellingham, Wash., where he was vacationing. At the time of his death Mr. Maxson was vice-president in charge of research of the Oliver Iron Mining Division of the United States Steel Co., Duluth, Minn. He joined Allis-Chalmers in 1927 as sales manager and chief engineer of the mining department, and was manager of the cement, crushing and mining machinery division from 1934 to 1944, when he went to Duluth. Mr. Maxson was a member of the American Institute of Mining and Metallurgical Engineers.

ARTHUR N. HEYMAN, a pioneer in the cement industry, died January 11. He was consulting engineer with the Universal Atlas Cement Co., Allentown, Penn., until his retirement eight years ago. Mr. Heyman joined the old Bonneville Cement Co., now Universal Atlas Cement Co., 45 years ago, when he moved to Pennsylvania from Sandusky, Ohio. He was a chemist, geologist and combustion engineer and during his later years he served as consulting engineer. An inventor of many pieces of machinery used in the cement industry, Mr. Heyman helped develop the rotary kiln and the automatic coal feeder used in this type of kiln.

W. B. PITTMAN, JR., manager of the San Jose plant of United Concrete Pipe Corp., Baldwin Park, Calif., died at his home on December 26, after a severe shake-up in an accident a few days before. Mr. Pittman started in the concrete pipe business with the Van Cleve Construction Co., Exeter, Calif., and later had his own plant at MacFarland.

ARTHUR O. NEUMAN, president and general manager of the Mission Concrete Pipe Co., San Antonio, Texas, passed away January 18. He had been associated with the industry for many years and was a member of the American Concrete Pipe Association, Chicago, Ill.

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industry news

Perlite Processing Plant

PERLITE INDUSTRIES, owned by Wright E. Cowden, Midland, Texas, recently began operation of its new perlite processing plant at Terminal, Texas. The plant, located between Midland and Odessa, on Highway 80 and along the Texas Pacific Railway, was engineered by Patrick C. Lipscomb, who is also general manager. S. L. Rust is plant superintendent.

Operation of the plant is built around the use of two rotary kilns which have a capacity of two tons of perlite rock per hour. Sized perlite rock, shipped to the plant from Florence, Colo., and Pioche, Nev., is unloaded into the receiving bin by a Model HA Payloader. The material is then fed by gravity into the boot of a bucket elevator which discharges into a small bin above a Syntron feeder which feeds it into the primary kiln. The primary kiln, after expanding the material, discharges the larger particles into the secondary kiln. The finer expanded particles are carried by suction into cyclones where they are collected and blended back into the main feed which goes to a 2-spout sacking machine. The larger particles are expanded in the secondary kiln and dropped on a drag conveyor where they are cooled and then carried to a bucket elevator which deposits the material in a bin above the sacking machine. The material is bagged in 4-cu. ft., valve-type bags. An outstanding feature of the plant is its ability to expand perlite particles up to ½ in. in size.

The company produces plaster aggregate, concrete aggregate and aggregate for use in oil-well cementing and loss circulation. It is believed to be the only plant expanding perlite for use by the oil industry.

The oil-well cementing material is made from a minus 6-mesh feed; the loss circulation material from a minus $\frac{1}{16}$-in. feed; and the building material from minus $\frac{1}{16}$ mesh.

Boosts Production

DRAGON CEMENT CO., INC. recently announced that cement production at its Thomaston, Maine, plant in 1952 totaled 1,578,000 bbl., as compared with 1,290,000 bbl. produced in 1951. Principal reason for the increased production was the installation last summer of a 11- x 356-ft. kiln, replacing an older 9½- x 200-ft. kiln.

The increased demand for cement in 1952 took all of the plant's output for that year and the demand is still so high it is expected to consume all of the plant's 1953 output. The Thomaston plant is the only cement plant in the New England area. A new finishing mill is now in the process of construction at the plant and is expected to be in operation in May of this year. John Pomeroy is plant superintendent.

Cement Plant Expansion

NORTH STAR CEMENT CO., Corner Brook, Newfoundland, is planning to increase the capacity of its plant, only recently completed, by about 100 percent within the next year. The plant, recently acquired by Canadian Machinery & Industries, Ltd., will add another kiln and auxiliary machinery. Of the 10,000 tons of cement produced to date, 60,000 bags have been marketed outside Newfoundland and about 30,000 bags on the island.

Perlite Industries' new processing plant at Terminal, Texas

Acquires Limestone Property

BETHLEHEM LIMESTONE CO., Bethlehem, Penn., subsidiary of Bethlehem Steel Corp., has purchased a large tract of land in Jefferson County, W. Va., and obtained options on another tract in Jefferson County and one in Berkeley County, W. Va. An official of the company stated that these acquisitions did not mean any immediate start of quarrying operations, but were obtained in line with the company's policy of acquiring reserves of metallurgical limestone. An exploratory drilling program is being carried on at the present time to determine the extent of the limestone deposits on these lands.

Silica Plant

BROWNTOWN SILICA CO., Hanover, Wis., formerly owned by P. W. Palmer, has been sold to Lyle T. Manley, Rockton, Ill., who has sold his similar operation at Portage and will operate the Hanover plant under the name of Lyle T. Manley Silica Co. Expansion and modernization are now underway at the plant. A new 2800-ton capacity storage silo is being added to the three already in use. Vacuum separators are installed atop the silos for separating and grading the silica. A 160- x 42-ft. building is also being built to house the plant equipment.

Vermiculite Plant

CAROLINA VERMICULITE CO., subsidiary of Zonolite Co., has established a new vermiculite processing plant at High Point, N.C. The plant will process vermiculite ore for use in North Carolina. This installation brings to 38 the number of processing plants in the United States and Canada operated by Zonolite Co. or its affiliate companys.

Crushed Stone Plant

FORT WORTH SAND & GRAVEL CO., INC., Fort Worth, Texas, has started production at its new $500,000 crushed stone plant at Bridgeport, Texas. The plant, which has a capacity of over 200 cu. yd. per hour, produces concrete aggregates, sewer stone, agricultural limestone and flux stone.

Gravel Plant Sold

THIEBAUD SAND AND GRAVEL, New Philadelphia, Ohio, formerly owned by Henry Thiebaud, has been sold to a partnership composed of James, Robert and Lawrence Spring, also of New Philadelphia.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 20,881,000 bbl. of finished cement in December, 1952, as reported to the Bureau of Mines. This was an increase of 5 percent compared with the output in December, 1951. Mill shipments totaled 13,740,000 bbl., an increase of 17 percent over the December, 1951, figure, while stocks were 11 percent below the total for the same month in 1951. Clinker production during December, 1952, amounted to 22,020,000 bbl., an increase of 6 percent compared with the corresponding month of the previous year. The output of finished cement during December, 1952, came from 156 plants located in 37 states and in Puerto Rico. During the same month of 1951, 19,874,000 bbl. were produced in 153 plants.

Quarry Permit Granted

PERMISSION has been granted by the Alameda County board of supervisors for the operation of a new stone quarry in the Alameda, Calif., residential area. Objections to the quarry had been made on the grounds of nuisance by dust and noise, and the possible danger to flood control of the creek. Permission was granted on the condition that the company make an expenditure of $10,000 for improvement of the quarry site, which would include planting of trees to prevent erosion and fencing of the area to reduce hazards to children.

Plastic Sand Mold?

A NEW CASTING PROCESS, which is still in an experimental stage, may offer new competition to the foundry sand industry. The process, which would cut the amount of sand in each mold to only 5 percent of normal, would, reportedly, produce a lighter, stronger mold at a considerably reduced cost. The new molds which are made of sand and phenolic plastic are only ¼ in. thick and are termed "shell molds." The future growth of shell molding is said to hinge heavily on further development of the machines that make the molds.

Lime Safety Standards

NATIONAL LIME ASSOCIATION BOARD OF DIRECTORS, in October, 1950, appointed Lea P. Warner, Jr., safety director, Warner Co., Philadelphia, Penn., to head a special committee to develop a set of safety standards for the lime industry.

Since that time, Mr. Warner has reviewed safety codes and standards of other industries for ideas and suggestions. Last September he completed the first rough draft of the lime industry safety standards, which is now being circulated among the committee members for their comments and suggestions. It is hoped that the work will be completed or nearly completed in the next six months for printing and distributing to the lime industry.

In addition to Mr. Warner, the safety standards committee is composed of the following members: M. C. M. Pollard, National Gypsum Co., Buffalo, N.Y.; Frank R. Dittoe, The Kelley Island Lime and Transport Co., Cleveland, Ohio; L. L. Huck, Mississippi Lime Co., Alton, Ill.; and L. N. Carmouche, The Dow Chemical Co., Midland, Mich.

Asbestos Purchasing Depot

THE DEFENSE MATERIALS PROCUREMENT AGENCY has released details of its previously announced plan for purchasing Arizona asbestos for defense and other essential uses. A receiving depot is to be established at Globe, Ariz. The government will pay $1500 per short ton for crude No. 1 asbestos; $900 per ton for crude No. 2; and $400 for crude No. 3. The program will run for three years, or until a total of 1500 tons have been purchased. Producers wishing to participate in the program must notify the General Services Administration, 49 Fourth St., San Francisco, Calif., on or before June 30, 1953.

Change of Ownership

CLINCHFIELD SAND & FELDSPAR CORP., Baltimore, Md., has announced that all of the interest of Henry H. Hanna in the Clinchfield company has been purchased by Harry T. Campbell Sons' Corp., Towson, Md. Upon Mr. Hanna's retirement, Bruce S. Campbell, president of Harry T. Campbell Sons' Corp., was elected president of Clinchfield Sand & Feldspar Corp. H. Guy Campbell was elected vice-president and Willard Hoffman was re-elected treasurer. Offices of the Clinchfield company have been moved to 413 Washington Ave., Towson, Baltimore 4, Md.

Builds Cement Silos

THE SOUTH DAKOTA CEMENT PLANT, Rapid City, S.D., recently completed construction of 12 additional cement storage silos. The new silos, each 26 x 103 ft., will increase storage capacity to 1,332,000 sacks of cement. There are now 16 silos at the plant. The new silos, including accessory machinery, were built at a cost of about $350,000.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of January, 1953, are listed by the Portland Cement Association as follows:

	Sq. yd. awarded During January 1953
Roads	2,622,246
Streets and alleys	1,025,607
Airports	1,225,987
Totals	4,873,840

Perlite Production

THE PRODUCTION of expanded perlite in 1951 totaled 134,479 short tons, which was 33 times greater than the output in 1946, as reported by the Bureau of Mines. The quantity of expanded perlite sold or used in 1951 was 133,175 short tons, valued at $7,243,298. The quantity of crude rock sold or used by producers in 1951 was 181,588 short tons, valued at $809,971.

In 1951, active mines were located in seven western states, with deposits in Nevada, New Mexico and Colorado furnishing 87 percent of the total. Perlite processing plants were located in 27 states throughout the United States. California led in the number of processing plants with 11, followed by Illinois and Texas with five each, and Pennsylvania and Utah with four each. Ten or 12 new plants are reported to be under construction.

The average value of expanded perlite in 1951 was $54.39 per short ton, a slight decrease from the $54.52 per ton shown for 1950.

Joins 1000-Day Club

ALLENTOWN PORTLAND CEMENT Co.'s Evansville, Penn., plant recently completed 1000 days of operation without a lost-time accident, making it eligible for membership in the Portland Cement Association's "1000-Day Club." The Evansville plant has been awarded the P.C.A. safety trophy in eight of the past 20 years for accident-free operation. A. E. Douglas, Jr. is operating manager; and P. B. Myers, plant manager.

Rock Companies Sold

SANTA PAULA ROCK CO. and El Rio Rock Co., which for the past eight years have been under the same ownership, were recently sold to Southern Pacific Milling Co., Santa Paulo, Calif., at a cost of approximately $500,000. Included in the transaction are all buildings, landleases and assets and equipment owned by the two companies. Former owners were L. C. Root, C. D. Woolsey, D. P. Woolsey, Ventura, Calif., and Nobel R. Brehm, Santa Barbara, Calif.

New Potash Discovery

THE DISCOVERY of a large potash deposit in west-central Saskatchewan was recently reported by Canada Southern Oils, Ltd., which made the discovery during an oil-drilling test. The company stated that conventional coring methods showed a thickness of 25 ft. of relatively high-grade potash at an approximate depth of 3800 ft.

Purchases Companies

FORT DODGE LIMESTONE CO., Fort Dodge, Iowa, owned and operated by Walter J., Ambrose and Robert Welp, has purchased Fort Dodge Concrete Co. and Fort Dodge Sand & Gravel Co.

Cover Picture

IN CLEAR CREEK VALLEY near Denver, Colo., the Cooley Gravel Co., operates a unique floating sand and gravel plant which is illustrated on this month's cover. The plant is a converted gold dredge which was changed over for aggregates production. Gold is still recovered as a by-product, and the amount is sufficient to pay for all electrical power used by the plant. Some interesting equipment is used to eliminate clay, and fine sand is recovered by using "liquid cyclones."

Scholarship Award

IOWA AGRICULTURAL LIMESTONE ASSOCIATION recently announced the selection of Garvin C. Matthiesen, Akron, Iowa, by the Scholarship Committee of Iowa State College, as the recipient for the association's 1952 Scholarship Award. This award is given each year to a senior student who is majoring in agronomy and is the third award since the establishment of the scholarship by the association. The two previous awards were to Leland Carlisle in 1950 and to Robert L. Olcot in 1951.

New Plaster Process

UNITED STATES GYPSUM CO., Chicago, Ill., has started production of "Structo-Lite," a ready-mixed perlite-gypsum plaster, at its Sweetwater, Texas, plant. A small processing plant is being built at Sweetwater for processing the ore obtained from perlite deposits in New Mexico. The Sweetwater plant is currently obtaining its perlite from the company's Fort Dodge, Iowa, plant.

Pakistan Cement Plant

A NEW CEMENT PLANT is being built in the Sind Industrial Trading Estate area of Hyderabad, Pakistan. The plant will be completed in about three years and will have a daily capacity of about 400 tons of cement. Raw materials from nearby gypsum, limestone and shale deposits will be utilized in the cement production.

Determination of Alkalies

DR. F. GILLE, director, German Portland Cement Association Research Laboratory, Düsseldorf, has concluded that accurate results may be obtained in the determination of alkalies in cement and raw materials with the large flame photometer, by using properly compounded standard solutions. These must have similar alkali, calcium, chloride and sulfate contents as do the cements or raw materials. It was noted that the alkalies in the cement correspond with those in the test solutions, the loss in potassium through volatilization usually being fairly well compensated by that in the coal. This was reported in *Zement-Kalk-Gips*, July, 1952, p. 20.

Quarry Firm Reorganizes

DIRECTORS of Cleveland Quarries Co., Cleveland, Ohio, recently voted to separate the company into two divisions, because of dissimilarity of the products produced. Arthur E. Tulk, formerly president of the company, has been elected chairman of the board and will be in charge of the Sterling abrasives division. Arthur J. Schneider has been elected vice-president and general manager of the abrasives division. William M. Jones, former vice-president and manager, has been made president of the company and general manager of the sandstone division.

The company's general offices at Cleveland will be moved to Amherst, Ohio, where they will be merged with present offices at the site of the sandstone operations. A sales office will be retained at the Cleveland location.

Canadian Cement Plant

A $1,000,000 CEMENT PLANT will be built in Villeneuve, Quebec, by European interests, as recently announced by the industrial commissioner of Quebec. Output of the plant, when completed next year, is expected to be 250,000 tons per year. A $4,000,000 shipping pier will be built next to the plant, along the St. Lawrence River.

Sand and Gravel Plant

FAIR TRADE SAND AND GRAVEL CO. has begun operations of its new plant at Meadow Creek, W. Va. Sand and gravel are obtained from a large artificial lake. C. C. Corker, owner of the company, estimates the sand and gravel deposit at 1,000,000 tons.

Freight Rate Decision

TWO RAILROADS were recently ordered by the State Railroad and Public Utilities Commission to haul a load of sand and gravel from Knoxville to Blair, Tenn., for $0.90 per ton. Knoxville Sandgravel Material Co. had contracted with Maxon Construction Co. to deliver 137,000 tons of sand and gravel to Blair. The railroads had at first agreed to haul the material for $0.80 per ton, but later raised the rate to $1.30 per ton. The Knoxville firm then brought its case before the commission which decided on the $0.90 per ton rate. The two railroads involved were Southern Railway and Louisville and Nashville Railroad.

Safety Council Meeting

A MEETING of the Eastern New York Mineral Aggregates Safety Council was held in Albany, N.Y., November 19, 1952, with an attendance of 33 persons, representing 19 companies.

Seymour Fleming, New York Trap Rock Corp., New York, N.Y., president, presided at the meeting. Reports were given by the secretary, treasurer and the accident reporting committee headed by R. J. Jager, Lone Star Cement Corp., New York, N.Y. The committee was requested to study various accident reporting forms to find a suitable one for adoption by the association.

John H. Murdock, Warner Co., Philadelphia, Penn., gave an address on electrical and mechanical hazards in plants. He also showed several film slides, giving a complete explanation of the hazards shown and the remedy for each.

The following officers were elected for the 1953 term: C. A. Gustafson, The Callanan Road Improvement Co., South Bethlehem, N.Y., president; C. F. Stetser, New York Trap Rock Co., New York, N.Y., vice-president; H. H. Kerwin, Eastern Rock Products, Inc., Utica, N.Y., secretary; and David Stevens, Jr., Lone Star Cement Corp., New York, N.Y., treasurer.

Out-going 1952 officers of Eastern New York Mineral Aggregates Safety Council, left to right: H. H. Kerwin, Eastern Rock Products, Inc., treasurer; Seymour Fleming, New York Trap Rock Corp., president; C. A. Gustafson, Callanan Road Improvement Co., vice-president; and Clarence Stetser, New York Trap Rock Corp., secretary

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Belt Conveyors For High Elevation

AT A LARGE DAM under construction in the Rocky Mountain area, an aggregate processing plant has been

Belt conveyor to surge pile. Note safety railing

provided at the job-site that is high in the mountains where snow and wind conditions are severe. Illustration No. 1 shows the surge pile from the primary crusher. The steel rods over the belt are of $\frac{7}{8}$-in. steel, as rods of smaller diameter could not withstand the severe climatic conditions. The second illustration shows a finished stacker-belt which is bent over an intervening pile of material and reaches over and down to its own service pile.

The steepness of the mountain side on which the plant is located made it imperative to use all available space but, if the conveyor had gone out in a straight line, the fall of rock from the end would have been too great and would have resulted in too many rock fragments or splinters and would have reduced the volume of the intermediate storage pile under the conveyor gallery.

Blending Fines Into Sand

THE MAIN BELT CONVEYOR at left of the illustration serves a portable plant which at the time of inspection was processing material for black top. The pit-run material was deficient in extreme fines, so 6 to 7 percent of top soil (mostly fine-blown sand) was added by an inclined belt conveyor, driven by a small gas engine. The attendant regulated the flow of fines as needed.

However, if all states follow the pattern of California's highway department and adopt its method of testing sand, this type of operation may become obsolete. This test (not a screen anlysis) is such that all material going into California's highways will have to be washed. The test is referred to as the "Sand Equivalent Test" and gives volumetric results instead of gravimetric. The volume of fines (clay, etc.) and the volume of sand are measured under standard conditions with the ratio for sand being set so high that washing will be necessary, even though the specifications do not specifically require washing.

Gas-driven belt conveyor adds fines to pit-run material

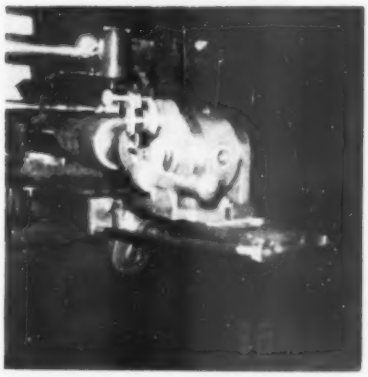
Milling Attachment for Handling Crusher Shafts

THE SIMPLE ATTACHMENT shown in the illustration is used by James River Hydrate and Supply Co., Buchanan, Va., for handling work which would ordinarily be too long for the milling machine table to handle. The attachment, which was designed by the company's chief machinist, is also applicable for use on crusher shafts or other related work.

The attachment was made from a 25- x 6- x 1-in. steel plate with slots milled into the top to align with slots already in the top of the miller. This flat plate is then welded perpendicular to a small 1-in. plate which is so shaped that it will fit flush with the vertical end of the milling machine table. Two $\frac{3}{4}$-in. holes were drilled into the ends of the small vertical flange, enabling bolts to draw the attachment up flush with the table. The milling machine table had been tapped for $\frac{3}{4}$-in. bolts at each side of the table.

Compensation for any droop or movement of the attachment, due to excessive load during milling, was provided by use of two $\frac{3}{4}$-in. hex bar supports. The bars were threaded on one end, rounded on the other and fitted into holes partially drilled through the attachment's flange near the bottom of the milling machine table. Nuts were placed on the threaded ends and welded to the extreme outer end of the horizontal plate,

Belt conveyor is bent over sloping area to prevent rock fragmentation or splintering



Milling machine attachment for handling long shafts. Shaft shown is used on a 38-B shovel

thus enabling the table attachment to be raised or lowered as needed by merely turning with a wrench.

As an additional help in aligning the jig, two ½-in. holes were bored in the flange to slip over two dowel pins which could have been anchored in the miller's table. Thus far, however, the company reports that the jig has proved very sturdy and the pins have not been required for proper alignment.

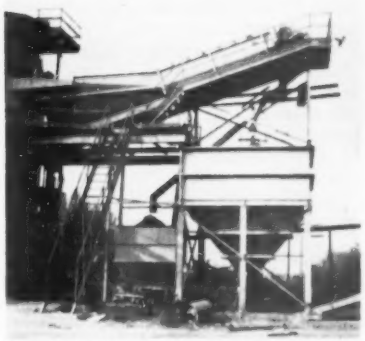
Roll Feed Hopper

A SAND AND GRAVEL OPERATION of importance, shipping roughly a million tons per year, uses as a part of its secondary crushing set-up, a set of 42- x 24-in. Pioneer rolls. A belt conveyor carries material to a small cylindrical bin which serves the crusher rolls, mounted on structural steel channel and "I"-beams so that the long axis of the rolls almost parallels the slope of the off-bearing belt conveyor. Directly under the crusher are six or more, small diameter, carrier conveyor rolls that are about 3 in. in diameter. Note the splatter board under the return side of the belt conveyor serving the small bin. The board sends any fines clinging to the under side of the belt to the crushing rolls.

Set-up of secondary crushing plant

Small Feeder Bin

AT A LARGE SAND AND GRAVEL PLANT sand from the Marcy rod mill is kept separate from current sand production and is stored in two bins over the loading belt. The small bin is usually filled first from an overhead Wemco sand machine, after which the larger

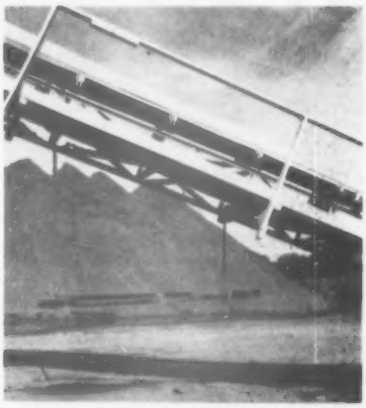


Small bin holds drier sand which can be fed to belt ahead of wetter sand from larger bin

bin is filled. This permits the small bin to drain for a considerable time, making it easier to feed the material, for blending purposes, to the loading belt. Or, if a straight manufactured sand is to be shipped, the drier sand is loaded on the belt first with the wetter sand from the larger bin placed on top, thereby helping to hold the sand on the inclined belt.

Safety Device

TO KEEP TRUCK DRIVERS and visitors from driving their cars under the toe of an inclined belt conveyor, one

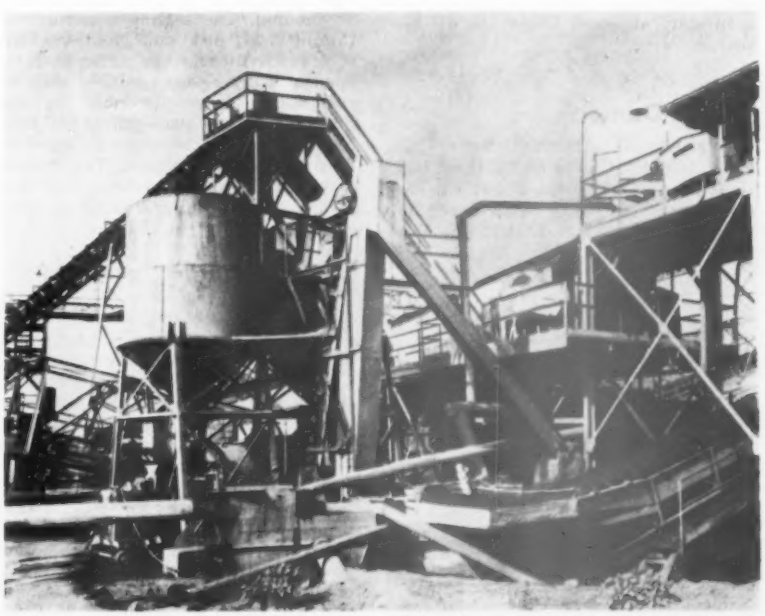


Chain-suspended log cautions motorists

plant operator uses a length of timber suspended by chains as a "low-bridge" warning.

Elevator for Pulp

THE CONVENTIONAL METHOD of handling the discharge product from a rod mill is by a sand pump. A western operator has a small, peripheral discharge Marcy rod mill. Two steel, hopper-bottom bins feed pea gravel into each end of the rod mill, with a small bucket elevator picking up the mill's discharge and chuting it to a 48-in. sand preparation machine, as shown in the illustration. According to the operators, a thicker pulp can be handled by using a bucket elevator than can be handled by the conventional method. The rod mill discharges through ports in the center line of the shell of the mill.

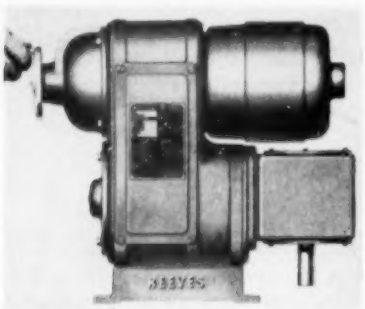


Rod mill discharges pulp to sand preparation machine by use of bucket elevator and chute

NEW Machinery

Variable Speed Right Angle Drive

REEVES PULLEY CO., Columbus, Ind., has brought out a fractional HP motor drive with right angle reducer to its line of variable speed drives



Motor drive with right angle reducer

and controls. It is composed of a standard NEMA frame, type "C", face-mounted motor, Reeves speed-varying mechanism and right angle worm gear reducer. The output shaft drives up, down or at right angles in the horizontal type and drives down or at right angles in the vertical models with speed ratios 2:1 through 10:1. The right angled shaft arrangement is said to save floor space by making it possible to put the fractional HP motor drive flat against the driven machine or by mounting it directly above or below the driven equipment.

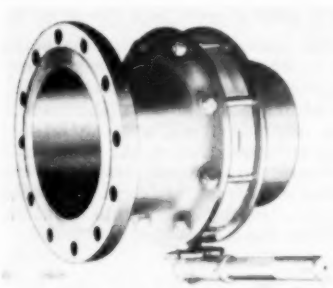
Trailer Dump

THE GALION ALLSTEEL BODY CO., Fidelity Bldg., Cleveland 14, Ohio, has released a 20 ft. long, 20-cu. yd. capacity package trailer dump known as Galion heavy duty Model 12. The body has a semi-bay front, while the tandem axle trailer has heavy duty, dump trailer suspension and straight top frame, available with hose operation or power fifth wheel. Dumping is handled by a Galion Model 77380 hoist consisting of two 3-section, 7-in. telescopic units with hoist capacity of 22 tons. Available tire sizes and brakes in several options to meet load and service requirements are also reported.

Tandem axle package trailer dump body

Butterfly Valve

KEYSTONE TOOL CORP., 5325 Kirby Dr., Houston, Texas, has developed the Keystone butterfly valve for use on liquid, sludge and dry material.



Valve for liquid, sludge and dry material

The valve dish seals in a resilient, oil and acid-resistant seat and provides a shut-off against pressures to 150 p.s.i. or vacuum. The sealing section, containing seat, disk and handle, which is indexed to hold the valve in fully open or fully closed position, may be removed without disconnecting the line. All valve sizes have full-hold opening which reportedly provides flow without turbulence. The valves, threaded, flanged or welding-end construction, are manufactured in sizes 2 in. through 12 in.

Bulldozer

THE BAKER MANUFACTURING CO., Springfield, Ill., announces production of its 109-hp. "15X" hydraulic no-pushbeam bulldozer for use with the HD-15 crawler tractor. With tractor and dozer frame rigidly bolted together, closer mounting of the 5366-lb. blade to the tractor and the suspension of the entire front end from two hydraulic arms, the 15X is said to be capable of exerting more of the tractor's weight and engine horsepower into down pressure to a maximum depth of 15½ in. below ground and a maximum height of 39½ in. above ground. Stabilizer bars connected to the hydraulic pistons and running from track to moldboard absorb torsional strain and reduce horizontal forces on the frame.

Hydraulically controlled bulldozer in action

Speed Reducer

PHILADELPHIA GEAR WORKS, Philadelphia, Penn., has introduced the Type HAT Philadelphia worm gear reducer for use as a conveyor drive. Double-torque control, an automatic and instantaneous shut-off device for overload protection, is said to eliminate the need for a sheer-pin coupling. To re-start operation after shut-off, only removal of excessive load is claimed to be necessary with no re-setting or replacement of parts. Horsepowers and ratios range from 3⅝ to 1 up to 6300 to 1.

Liquid-Tight Conduit

THE AMERICAN BRASS CO., Waterbury, Conn., has introduced the "Sealtite" flexible, electrical conduit type UA with extruded synthetic core covering, to protect wiring against moisture, oil, dirt, chemicals and corrosive fumes. The conduit, made of interlocked, zinc-plated steel strip with copper bonding conductor wound spirally between the convolutions inside, is available in long lengths in nominal electrical ID sizes ⅜ to 1¼ in. inclusive.

Flexible electrical conduit with extruded synthetic core covering

Portable Air Compressor

O. K. CLUTCH & MACHINERY Co., Florence St., Columbia, Penn., has started production of a 75 c.f.m. single-stage, gasoline-powered portable air compressor. The 1280-lb. Hornet "75" uses a 6-cyl. engine, three of which are for air compression and the other three for power. Mounted on a three-wheel trailer with retractable pivot wheel and lockable tool boxes on each side of the trailer, it handles a 45-lb. paving breaker, a 45-lb. rock drill, two backfill tampers, two clay spades, two riveting guns, or any combination of two small tools.

Single-stage air compressor

Compression Tester

FORNEY INC., Elm and Russell Sts., New Castle, Penn., has announced a new model compression tester for concrete block, lintels, cylinders, brick, beams and staves. It is known as the Model 1216D and conforms to all requirements set up by the American Society for Testing Materials. The machine is produced in both manually and electrically operated models. The electrically driven model may be operated manually also. The manufacturer claims that the chief advantage of using this machine include: quality control of production, immediate certification of a run of products, savings in material costs, elimination of long waits for laboratory reports and avoidance of costly mixing errors.

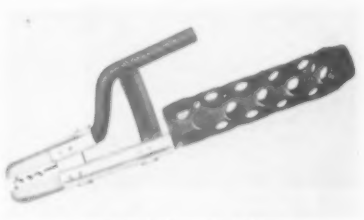
Truck-Mounted Shovel-Crane

SCHIELD BANTAM Co., Waverly, Iowa, has brought out its new ⅜-cu. yd., heavy-duty Model T-35, truck-mounted shovel-crane with matching attachments, including shovel, clamshell, dragline, back hoe, magnet, wood grapple and pile driver. Features of the new model are anti-friction bearings; machine-cut gears; internal expanding, band-type clutches; external contracting brakes; band-type swing brake for locking basic unit in position; jackshaft-mounted tagline; trunnion base with wide trunnion rollers and the use of four adjustable cam-type hook rollers. Other reported advantages include mechanical control levers located to permit simultaneous control of swing and other operations, a hinged metal door on cab top which can be opened for increased operator visibility and sliding panel windows providing ventilation. The 6-ton capacity machine mounts on a special Bantam crane carrier or any standard tandem or heavy-duty single axle truck.

Heavy-duty shovel-crane

Electrode Holder

THE LINCOLN ELECTRIC Co., Cleveland 17, Ohio, is now producing a 400-amp., insulated electrode holder, the Cooltong, which is made to handle ⅛- to $\frac{5}{16}$-in. electrodes with wide openings for fast release of stubs. Specifications include nose construction of a copper core between four and six layers of laminated, glass-impregnated, plastic cloth; jaws, covered by this insulation, made of non-spatter Mallory 3 metal; and current carrying frame parts made of copper reinforced with steel and insulated with copper sheathing. The perforated handle is said to be unbreakable and to reduce heating from induced currents when welding with a-c.



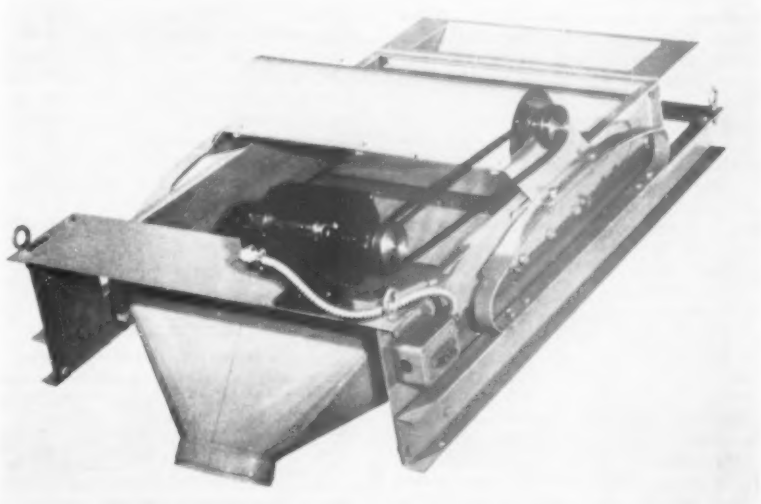
Insulated electrode holder

Fork-Lift Trucks

TRACTO-LIFT Co., 2011 Baltimore Ave., Kansas City, Mo., announces the addition of the "Power King" series to its line of heavy-duty fork-lift trucks. The three new models have more than twice the capacity of standard models. They feature oversize pneumatic tires on a basic tractor unit and an operator's protective guard. Lifting capacities on the new series are from 10,000 to 15,000 lb. Fork lengths range from 36 to 108 in. in 6 in. variations. They are able to climb inclines up to 20 percent, have six speeds forward and reverse, and 12 in. underneath clearance.

Vibrating Screen

UNIVERSAL VIBRATING SCREEN Co., Deane Blvd. and St. Paul R.R., Racine, Wis., has developed a 150-lb., "Uniflex" 24 x 36-in. high-speed vibrating screen which is offered in single, double-deck, open or enclosed construction. Equipped with feed pan and discharge chute, ⅓ hp., 1-60-110 motor and V-rope drive, it is arranged for either floor mounting or aerial suspension.



High-speed vibrating screen equipped with feed pan and discharge chute

PROCESSING AGGREGATES For Folsom Dam

By WALTER B. LENHART

Overall view of Folsom dam aggregate process plant. To the right is the primary surge pile, and to the left is the cobble storage. Between the two stockpiles is the scalping screen tower and crushing unit

TO UNDERSTAND FULLY the factors behind the rather unusual design of the aggregate processing plant at Folsom dam, now under construction on the American river about 22 miles east of Sacramento, Calif., one must go back to the source of the sand and gravel being processed. The headwater of the American river is in the high Sierras. The region now classed as the Sierra Nevada mountains was, at one time, much lower in elevation. During that geological era great beds of gravel and sand were built up. Later, granitic intrusions elevated the gravel beds several thousand feet higher. These beds contained free gold scattered fairly evenly throughout the mass, but where streams cut through the beds local concentrations of gold developed. The early 49ers attacked the rich concentrations in the stream beds. When these were about exhausted they turned to the virgin beds of gravel that then rested high above the stream beds. Canals or ditches were built from still higher sections of the mountains and water was brought to points above these beds of gravel. Hydraulic monitors were installed and the high beds of gold-bearing gravel were washed into sluice boxes. The extent of this type of operation can be gauged from the well founded estimates that on ditches alone over $100,000,000 had been spent.

The beds of gravel contained only a few cents gold per cubic yard but the mining methods employed were cheap. For profits to be made, millions of cubic yards of gravel had to be washed annually. This huge yardage of gravel accumulated in the stream beds below. The finer silt was carried down into the Sacramento river drainage system where it eventually stopped practically all river navigation. In some areas local towns had to be protected by levees and dikes. Marysville on the Yuba still has these dikes remaining.

Reclaim Gravel Worked for Gold

Several years after the gravel beds were first attacked, there came a spring flood which cleaned the local and steep valleys of the gravel that the gold miner had left there. The vast beds of gravel spewed out at the throat of the streams that fed the Sacramento river and buried acre after acre of farm land. One great orchard was reported to have been buried by 11 ft. of this type of gravel. As a result of repeated floods of this nature, the anti-stream pollution law was passed and its enforcement ended gold placer mining in California. Enforcement of this law is in the hands of the Corps of Engineers, U.S. Army, which controls river navigation. Placer mining in California now can only be practiced where the debris does not pollute a navigable stream, but as practically all streams in California where gold exists drain into the Sacramento river, it has ended placer mining there.

The next step in gold recovery in California—and it too is related to the gravel processing at Folsom dam—was the introduction of gold dredging. These dredges worked over vast flat lying gravel beds that accumulated in the foothills of the Sierra Nevada mountains. The dredges float in a pond with no drainage into any stream. Hence, gold dredging in California is still practiced. The land being dredged is semi-arid and of no great agricultural value. Because of their extremely low operating costs and huge hourly tonnages handled, dredges can operate profitably on gravel that contains only a few cents gold per cubic yard. One well established gold dredging company has reported that in 1952 its operating costs were between 4 and 8 cents per cu. yd. Gold dredges have left behind them millions upon millions of cubic yards of gravel debris, and at Folsom dam this type is one source of aggregates. The second source is some of the previously hydrauliked gravel that came down the stream with the spring floods. It is, as one might expect, deficient in fines.

Sign at dam site gives interesting information concerning project

The debris left by the gold dredges is also deficient in fines. To understand the reason for this, in a case where no drainage to adjacent stream beds is permitted, one must take a brief look at the method of operating a gold dredge. Some of these giants excavate to 135 ft. below water with a bank 50 ft. above water. They are, for the most part, ladder-type dredges. A bucket line brings up the virgin gravel and dumps it into a rotary screen. The plus $\frac{1}{2}$-in. material is sent to a stacker belt and the material dumped back to the pond, but far enough away to prevent interference with dredging. The minus $\frac{1}{2}$-in. fraction goes through the gold re-

Aggregates for Folsom dam, under construction by Corps of Engineers, U.S. Army, produced in plant which reclaims gravel worked for gold on the American river near Sacramento, Calif. Rod mill manufactures additional fine sand requirements

Field scalping plant prepares two sizes. Note haulage unit and shovel handling material

covery plant on the deck of the dredge. This fine material is then sent directly back to the pond in which the dredge floats. This means, in essence, that the fines are dumped *under* the dredge and below water. Later the oversize fraction is deposited on top of the fines. So at Folsom dam when cobbles or coarser gravel is wanted it usually comes from old dredge debris. The intermediate sizes of gravel and most of the sand comes from "bar," or river deposits. But to obtain added and necessary fines some sand fractions are reground in a rod mill.

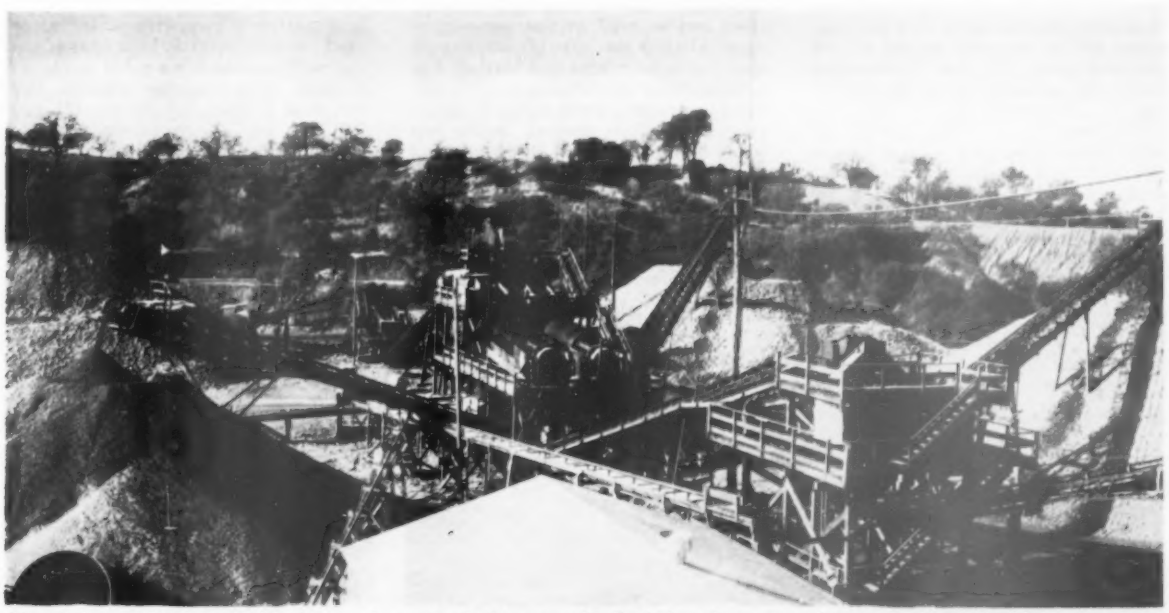
Returning for a moment to the anti-stream laws in California or, as they are more generally referred to, "The Anti-Debris Law," navigation in our streams and harbors is under the control of the Corps of Engineers. Flood control and control of debris carried by floods is of significant importance, for it is one of the main reasons why the dam is being built—and being built by the Corps of Engineers. However, California has its great Central Valley Project that envisions scores of multiple-purpose dams and reservoirs which is sponsored by the Bureau of Reclamation. Shasta dam, Friant dam, Tracy pumping plant—second largest pumping plant in the world, are all a part of this great irrigation and water conservation project.

Whenever a great multiple-purpose dam and reservoir is built not one but two dams are needed. A multiple-purpose dam such as Hoover dam on the Colorado river is a power project, but it also controls water for irrigation in the Imperial-Gila-Coachella Valley areas, all a considerable distance below Hoover dam. But power requirements and water requirements for irrigation do not always coincide. To correct this, two dams are usually built. Hoover has Davis dam as a part of its afterbay facilities; Shasta has Keswick dam; Grand Coulee will have Chief Joseph dam; Elephant Butte dam on the upper Rio Grande river has Cabrillo dam as its control unit. At Folsom dam, Nimbus dam is being built seven miles down stream from the main structure as part of the afterbay facilities.

Though construction of Folsom dam itself is under the direction of the Corps of Engineers, the power plant and related facilities, and Nimbus dam with its power plant, are under the direction of the Bureau of Reclamation. However, when all is completed the system will become a part of the Central Valley Project which is a Bureau of Reclamation function.

Gravel Plant

Aggregate production at Folsom dam involves excavation at two pits with a portable scalping plant at one pit. Material is transported by truck one to two miles to the main



Minus ¾-in. material is prepared in the screening section in the center with finished product conveyed to surge pile to the left. Equipment includes two vibrating screens, two rotary screens and twin screw-type sand classifiers. Vibrating screens in the screening tower in the left, foreground prepare 1½ to 3-in. and ¾ to 1½-in. material. Cobbles are stockpiled to the left

A 36-in. belt conveyor delivers pit-run material to 60 ft. high primary surge pile

processing plant. From the processing plant the gravel is again trucked 2.7 miles to a five-compartment concrete bin under which is a belt conveyor. Four heavy-duty Syntron vibrating feeders, plus auxiliary emergency gravity-type gates, can recombine the coarser sizes. This material is then transported on a 3300-ft. belt conveyor system to the batching plant on the south bank of the American river. The conveyor crosses the river on a 500-ft. long steel suspension bridge. Aggregate is rescreened and rewashed in the batching plant on two sets of two double-deck screens mounted over the bins.

The coarse aggregate is recombined before starting on the 3300-ft. trip by belt conveyor to permit a greater load to be carried on the 30-in. belts and to prevent roll-back of large sizes on steep sections of the system. Sand is carried separately on this belt conveyor and is not reprocessed at the batching plant. The sand is similarly fed to the conveyor from the concrete bin by a Syntrol vibrating feeder.

The long belt conveyor is made up of five flights, ranging in length from 520 to 960 ft. between centers. The final conveyor section is 609 ft. between centers and rises 140 ft. It is powered by a 125-hp. motor and uses a 6-ply Goodrich belt. The entire system can handle 550 t.p.h. Several of the conveyor flights were used in the construction of Bull Shoals dam; new sections were purchased from Barber-Greene.

Gravel processing is all done below the damsite on the north bank of the American river. The town of Folsom, the California state prison nearby, rough terrain, and remains of power facilities of a public utility all made it impractical to secure gravel from areas along or adjacent to the south bank of the river.

The gravel processing plant was designed by Mines Engineering & Equipment Co., San Francisco, which also supervised its construction. The plant was built by the contractors. Practically all equipment was purchased through Mines Engineering & Equipment Co.

Folsom dam required a large volume of gravel to be removed from the river bed as well as the removal of some 110,000 cu. yd. of ledge rock that had to be drilled and blasted. For drilling there are available 20 Ingersoll-Rand wagon drills and I. R. Quarrymaster drill. A fleet of Euclid bottom-dump trucks haul the debris out of the excavated area; this material is used mostly for rock fill. Loading is by two 2½-cu. yd. Northwest 80-D shovels and a 4-cu. yd. No. 11 Marion diesel shovel. Also available are a 5-cu. yd. Manitowoc and a 2½-cu. yd. Bucyrus-Erie dragline, plus a 3½-cu. yd. P & H and a Link-Belt Speeder shovel.

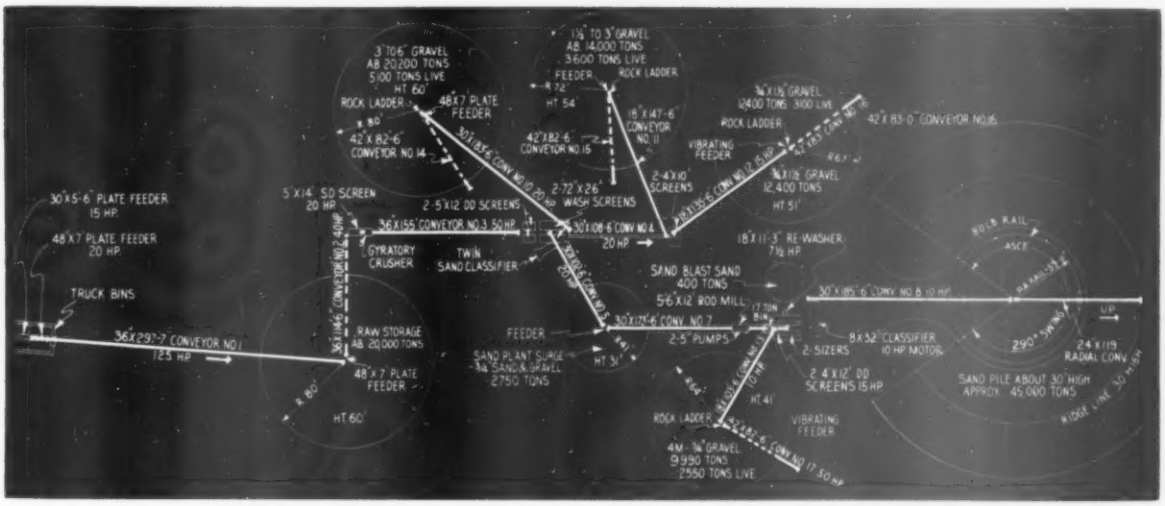
Shovel loading river gravel to fleet of bottom-dump trucks

Stone ladders are used in stockpiling all coarse aggregate sizes

Because of the depletion of sand and gravel in many of our river deposits, the subject of transportation from across-the-river areas is becoming more important each year. Transportation by long belt conveyors on a steel bridge across the waterway is one solution so the Folsom bridge installation is of added interest.

The bridge is of the suspension type. The main cable is 1⅞ in. dia., 91 wires, bright bridge strand. The riser cables on 10-ft. centers are ⅜-in. bright strands wire with cable clamps used (in duplicate) at both ends of the risers. The main wind cable is 1½-in. 61 wire, bright bridge strands. The two steel pivoted towers are 121 and 125 ft. high above their concrete footings. The deck of the bridge provides adequate room for the 30-in. belt conveyor that rides it, and a walkway. The deck is roughly 90 ft. above the river. The two steel towers are spaced 500 ft. apart and at full load the main carrier cable has a sag of 47 ft. The sag of the main deck between full and no load is estimated to be about 5 ft. It is 880 ft. between anchorage points of the main cable. The belt conveyor on this bridge is 960 ft. between centers and has a fall of about 30 ft. in the direction of travel. The bridge was erected by Consolidated Western Steel Corp., materials were fabricated by Columbia Steel Corp., a division of United States Steel. This section of the aggregate delivery system of belt conveyors came from Bull Shoals dam and is Robins equipment.

The portable field scalping plant is made up entirely of Telsmith equipment, except for the drive which is



General arrangement of aggregates plant for Folsom, showing the large stockpiling capacity

an International UD 14-A diesel engine. There are three conveyors involved; a 36-in. unit that carries the pit-run dredge tailings from the reciprocating feeder to the 5- x 14-ft. single-deck, dry scalping screen, and two 30-in. stacker belts. The unit has an over-all length of 44 ft. 9-in. without the cobble stacker, which is attached to the rear end of the unit. The reject stacker is mounted at the side. The capacity of the plant is about 450 t.p.h., of which roughly 100 t.p.h. are cobbles (plus 3-in. minus 6-in. gravel). The portable plant is mounted on ten rubber tires but when in use levelling jacks carry most of the weight.

The purpose of the field plant is to supply most of the cobbles. The plus 6-in. and minus 3-in. fractions can be rejected although some of this material is used in the earth fill portion of the 23,000-ft. long dam. In operation a Euclid bottom-dump truck temporarily ground stored alongside the field plant.

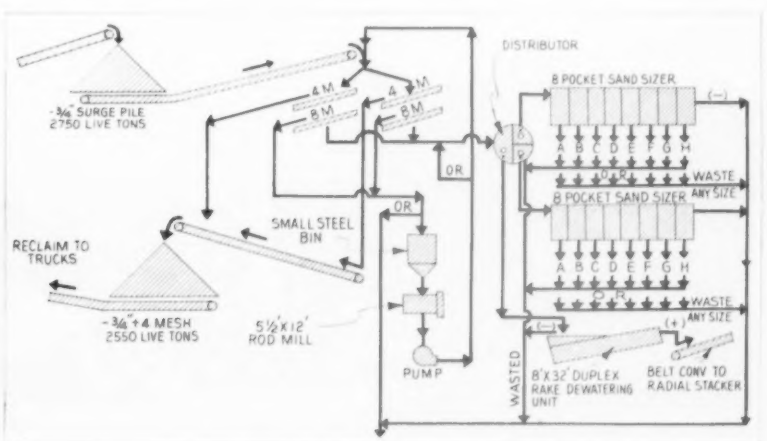
Another unusual feature of this operation is the use of two truck hoppers at the main processing plant. These both feed the same 36-in. stacker belt (No. 1) serving the 60-ft. high primary surge pile. Both truck hoppers have 12-in. spaced horizontal grizzly bars over them and the oversize is wasted. It is a very small amount. The smaller truck hopper feeds material to the belt by a 30-in. Telsmith reciprocating pan feeder, and the larger hopper by a 48-in. feeder of the same type. All pan feeders in use at the operation are driven by 20-hp. U.S. gearhead motors. The purpose of the two truck hoppers is to make possible a rough blend of cobbles (from the portable field plant) and the finer pit-run from Mississippi bar. It is desired to put about 100 t.p.h. of cobbles into the washing plant and this system is designed to assure that production. The primary belt feeding the 20,000-ton raw surge pile (7500 tons of which is live storage) was originally powered by a 75-hp. motor but now uses a 125-hp. motor.

The project was inspected during the first week in December of last year. Concrete was being placed on the dam proper; at that time less than 25,000 cu. yd. had been placed, but it was indicated that the sand recovery system was to be revised because of the deficiency of fines.

The concrete in Folsom dam uses aggregates that are typical as regards the practices of the Corps of Engineers; plus 3-in. minus 6-in. cobbles; plus 1½-in. minus 3-in. gravel; plus ¾-in. minus 1½-in. gravel, and plus 4 mesh minus ¾ in. for the coarse sizes, and one grade of concrete sand. At the outset of operations a 3-bag (or richer) mix is being used but it is hoped that with a better sand gradation a 2-bag mix may be used similar to the practice at Pine Flat dam on the King's river (also a dam being built by the Corps of Engineers but to be integrated into the Central Valley project.

The four sizes of finished gravel are

Cobbles (3-in. to 6-in.) are reclaimed by a 42-in. belt conveyor. Driver loads his own truck from the belt conveyor



Flowsheet of the fine sand recovery operations

Final sand preparation section has a rod mill in building to the left and two sand sizers on first deck of tower. Two vibrating screens are on the top deck. To the right on the ground is a duplex, rake-type sand dewatering unit

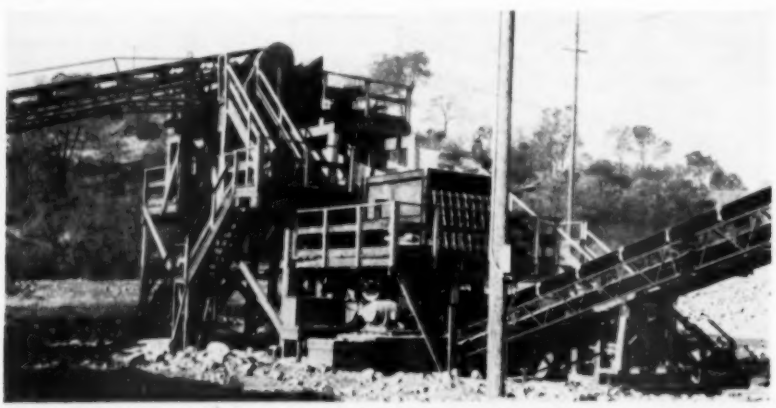
ground stored with stone ladders being used for the coarser sizes. Each stockpile has its individual 42-in. reclaiming belt and all belts are powered with 50-hp. motors. The cobble reclaim belt is fed by a reciprocating feeder but the other three sizes use a heavy-duty Syntron electrical vibrating feeder. The belts are all slightly inclined upward and are left loaded. All material from the plant is hauled by truck upstream a distance of about 2.7 miles to a receiving bin serving the belt conveyor system. The truck drivers load their own trucks from a control station near the loading belt. The purpose of the over-powered drive (50 hp.) is to insure no stalling of the loaded belt. The tunnels are 8-gauge 10-ft. dia. Armco corrugated multiplate.

From the primary surge pile the material first goes over a 5- x 14-ft. single-deck, dry Telsmith scalper with a perforated steel 7- x 7-in. deck. Oversize falls to a 13-B gyratory crusher set to deliver a minus 6-in. product. Throughs from the crusher and the undersize material from the scalper falls to belt No. 2 (36-in.) which delivers the material to two 5- x 12-ft. double-deck, dry vibrating screens, each receiving a split feed from belt No. 2. The top deck is a wear-taker; the bottom deck has a 1¼-in. wire. All oversize goes to two 6- x 26-ft. Telsmith Hercules rotary scrubber screens. The minus 1¼ in. (called a minus ¾ in. and sand) falls to a belt conveyor and is sent to a surge pile. The use here of a surge pile as a source for the sand, and the plus 4-mesh minus ¾-in. gravel, is in itself quite unique.

The two wet rotary screens that receive the plus 1¼-in. material are placed side by side. Each is powered by a 30-hp. U.S. asbestos clad motor. The screens have a 17-ft. sand jacket. As installed the main barrels of the screens have first a 5-ft. solid section for scrubbing purposes, followed by 3 ft. of 1-in. round holes, the 4 ft. of 1½-in. round holes followed by 4 ft. of 2-in. round holes. Next is 5 ft. of 3-in. square holes with a 5 ft. end section of 3½-in. square holes. The barrel is perforated plate.

The sand jacket starts under the 1-in. round holes and has three 4 ft. sections of ⅜ in. round perforations followed by 5 ft. of ¾-in. wire. Material passing through the sand jacket falls to two 30-in. x 25-ft. Telsmith twin sand screws powered by a 20-hp. motor. Sand recovered was missed in the first screening operation ahead of the rotary screens. The twin screws unload to the same belt that serves the surge pile mentioned above. Overflow from the twin screws is sent to a tailing pond.

The plus 3-in. minus 6-in. cobbles discharge from the end of the rotary screens and are sent to stockpile by a belt conveyor. The plus ¾-in. minus 3-in. washed gravel falls to a belt conveyor which carries it to a screening tower containing two 4- x 10-ft. screens. Top decks are 2-in. wire and bottom decks are ¾-in. wire. The top deck prepares the plus 1½-in. minus 3-in. material which is transported by belt conveyor to a storage pile. Oversize material from the top of the bottom deck is the plus 1½-in. minus ¾-in. gravel, and this top is sent by belt conveyor to a storage pile. Fine material from the lower deck is small in amount and is wasted.



A 5- x 14-ft. scalper screen located ahead of a gyratory crusher operating in open circuit with the scalper. Screen feed from the primary surge pile is obtained by means of belt conveyor, to the left

Sand Plant

Minus ¾-in. material in surge pile No. 2 is fed to a 30-in. conveyor belt by a Syntron feeder and is delivered to two wet, 5- x 12-ft. Telsmith Vibro King double-deck screens that have 4-mesh and 8-mesh lower decks. Oversize falls to a belt conveyor and is delivered to its storage pile, as is the plus 4-mesh minus ¾-in. gravel. The material on the bottom deck can be split into desired fractions and one fraction sent to the rod mill and the other to the distributor ahead of the two 8-spigot Dorr sand sizers.

The rod mill is a 5½- x 12-ft. peripheral end discharge Marcy unit. This is one of the first rod mills of this type to be used in the rock products industries. It is fed through the trunnion at one end. The discharge ports are around the periphery of the shell at the end opposite the inlet. This permits a no-pulp depth at the discharge end and a rapid movement of pulp through the length of the mill.

Theoretically, at least, this type of mill permits a rock particle to be broken to a finer size by a few repeated impacts, then ejects them from the mill relatively soon before additional impacts can grind the material finer than desired, or produce unwanted slimes.

The rod mill was loaded originally with 5 tons of 2-in. dia. high carbon steel rods, 5 tons of 2⅝-in. dia. rods and 10 tons of 3-in. dia. rods. All are 12-ft. long. Two 5-in., type "K" direct-connected Wilfley sand pumps handle the mill's discharge and these can pump either to the double-deck screens that operate in closed circuit with rod mill, or to the distributors ahead of the sand sizers.

Another unusal feature of this rod mill installation is that the material fed to it is essentially a plus 8-mesh

minus 4-mesh product, as the pit-run material is high in this size of sand. This size of sand can be wasted if desired.

The mill is intended to produce additional fines in the 100 mesh and finer range. The rod mill is powered by a 125-hp. motor. No accurate figures are available on tonnage ground.

The feeder to the sand sizers and the rake dewatering unit is a Concenco No. 109 revolving feed distributor made by Deister Concentrator Co., and consists of a stationary splitting tank with three compartments, and a revolving tank to distribute feed to the splitting tank. The revolving tank is mounted on vertical anti-friction bearings. It was first developed as a means of feeding a group of concentrating tables with controlled amounts of feed. At Folsom dam the splitting tank has three compartments. One compartment uses half the bottom area with the pulp from this compartment going direct to the Dorr rake dewatering unit. The remaining half is divided into two equal amounts so that each of the two Dorr sand sizers receives one-quarter of the total pulp handled.

The two size 8-EX Dorr sand sizers are installed in a manner somewhat similar to those at Pine Flat dam, with the individual spigot products either combined and sent to the rake dewatering unit, or one or more fractions wasted all, or in part. At Folsom dam that size of sand from a spigot that is most adaptable for preparation of sand for sand blasting purposes can be passed to an 18-in. x 11-ft. 3-in. Telsmith rewashing screw and the prepared blasting sand ground stored.

The Dorr sand sizer is a hindered settling device with the feed entering at one end of the unit. The size of the settling area and the volume of rising water in the column causes the coarser size to settle out at the inlet end. As the pulp flows through the trough-like unit increasingly finer sizes of sand settle out and discharge through a spigot at the bottom of each hopper. The eight sizes of sand produced range progressively from minus 8 mesh to 200 pan, and these eight sizes can be recombined, or rejected, as desired. It is a fully automatic unit and is practically a trouble-free installation.

The finished sand is stacked by a radial stacker that is capable of building a stockpile of 45,000 tons capacity. The material is reclaimed by front-end loaders and/or shovels. This system of reclaiming sand was adopted after observations of the adverse results obtained at Pine Flat dam by the use of a tunnel reclaiming system for the sand. The radial stacker has a traverse of 209 deg. and the sand at the ridge is 30 ft. high with an angle of repose of 32 deg. Drainage time is 72 hr. The belt for the stacker is 24 in. wide and 119 ft. long between centers. The plant has a capacity of 700 t.p.h.

Radial stacker for stockpiling sand. Pile holds 45,000 tons providing sufficient material for a minimum drainage period of 72 hr. Material is reclaimed by front-end loaders or shovels

Five Jacuzzi Bros. Inc., deep well pumps (one a spare) supply wash water for the plant. The pumps can supply a total of up to 5000 g.p.m. at 90 p.s.i. They are 5-stage, 10-in. dia. units and pump into an 18-in. header.

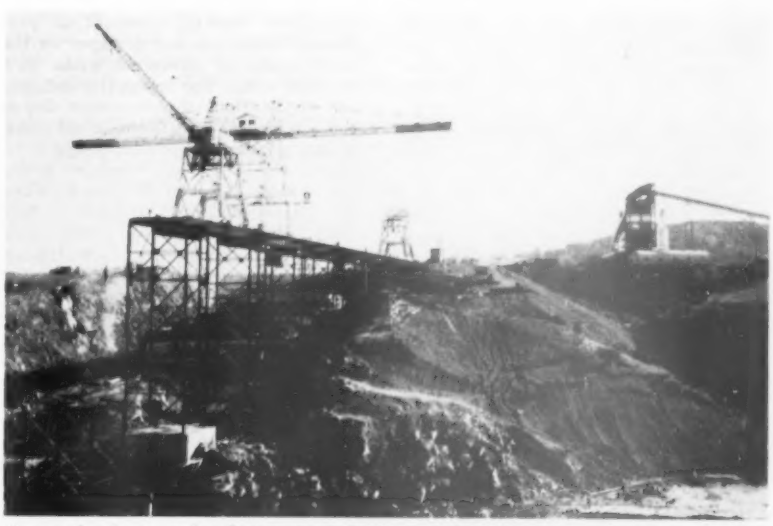
Folsom Batching Plant

The concrete batching plant at Folsom dam is a complete C. S. Johnson unit and uses three 4-cu. yd. Koehring tilting-type mixers. There are five compartments for aggregates with a capacity of 1100 cu. yd. and a central compartment for portland cement that holds 1350 bbl. The mixers powered by 50-hp. Allis-Chalmers motors have pneumatic tilting rams.

A pivoted distributor at the top loads the bins. Wear resisting liners are used at points of heavy wear. The cement batcher is a model 38 fully automatic 300 lb. weigh batcher with 12- x 12-in. rotary valves. The equipment includes a print-weight attachment for the 24-in. dia. dial scale. Cement is cooled by a Fuller Co. cooling system. Cobbles are batched on a Model 63, 5000-lb. Johnson fully automatic weigh batcher and each of the other aggregates has a similar weigh batcher. Air entraining admixture equipment is fully automatic and includes a 100-gal. storage tank. Water is batched in a Model 112, 2000 lb. capacity Johnson water batcher. Also available for cement storage are two 30-ft. dia. auxiliary storage silos, each of which holds 7315 bbl. Bulk cement is trucked to the batching plants from the manufacturer.

Each Koehring mixer is provided with a Claggett consistency meter, the principle of operation being one of a weight reaction on a torque tube with rocker arms at the rear of each mixer. Movement of the scale levers is transmitted to an induction coil located on each mixer trunnion frame. The armature travel in the induction coil is duplicated in a coil in the graphic recording unit. The pen travel is a definite sweep each time the mixer is righted and charged, then the consistency range is recorded as the

(Continued on page 127)



Hammer head crane to handle concrete at the dam site. Batching plant may be seen to the right in the background

Looking toward speaker's table at annual banquet of the N.C.S.A.

Stone Producers Focus Attention On

OPERATING PROBLEMS

National Crushed Stone Association annual convention reviews business conditions, new specifications, status of percentage depletion, and highway trends

MORE THAN 800 ATTENDED the 36th annual convention of the National Crushed Stone Association, February 2-4, at the Hotel New Yorker, New York, N.Y. The attendance was considered excellent for an off-exposition year and included a large number of operating men attracted by a program that had two sessions scheduled for discussion of production problems.

The 1954 convention and exposition is to be held at the Conrad Hilton hotel in Chicago, February 22-24, which is the week following the combined conventions of the National Sand and Gravel Association and the National Ready Mixed Concrete Association. Plans ahead call for the 1955 convention to be held at the Netherland-Plaza hotel, Cincinnati, Ohio, the week of February 6, to be followed in 1956 at Chicago when the biennial machinery exposition will again be held. The practice continues whereby N.C.S.A. and the N.S.G.A. and N.R.M.C.A. hold meetings in consecutive weeks in connection with machinery expositions in the even years. The summer board of directors meeting of N.C.S.A. is to be held June 16, 1953, at the Seigniory Club in the Province of Quebec, Canada.

Convention Program

In addition to the two sessions set aside for operating men, the various sessions covered a number of subjects of timely interest to the industry. President Horace C. Krause presided for the opening session which summarized business conditions and heard the annual reports of the administrative director, the engineering director and the field engineer. A nationally-known author also spoke at that session on the subject of sales.

W. T. Ragland, Jr., Superior Stone Co., Charlotte, N.C., was presiding officer for a session which heard the committee reports, a report on percentage depletion and a paper on the construction of pavement bases with crushed stone. The legislative outlook, the application of percentage depletion regulations to the crushed stone industry and employer-employe relations were covered in a session under the chairmanship of Wilson P. Foss, III, New York Trap Rock Corp., New York, N.Y. A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn., was chairman of a meeting which emphasized highways.

Chairmen for the two operating sessions were Dexter Bullard, New York Trap Rock Corp., for one, and G. D. Lott, Jr., Palmetto Quarries Co., Columbia, S.C. The use of heated screens, safety and millisecond delay blasting were covered in the first session. This meeting was conducted along the pattern of last year's session, with plenty of time for questions and answers, those having questions writing them on a piece of paper and handing them to a monitor. The slips of paper were passed to the speaker's table for reply to the questions. This idea works very well and proved productive of many questions. People unaccustomed to speaking need not worry about getting up on their feet, with this system, and need have no fear that they might be criticized for asking an unintelligent question. At any rate, the system works and the meeting proved lively and informative.

The second session covered the subject of drilling and, in addition, featured presentations of quarry operations by moving pictures and slides. The moving pictures and slides covered eight different operations with commentary by a qualified official of each company. They were excellent and well received, provoking many questions which proved that much may be derived by pictorial presentation.

All three morning sessions began with presentation of movies. One of the movies, entitled "Paving the Angles" and "Proving Ground Operations" was in two parts, presented through courtesy of the Proving Ground Section of General Motors Corp., Milford, Mich. The first part showed the methods used for spreading and rolling the bituminous concrete used for surfacing, where the

track sloped at an angle of up to 37 deg. Typical proving ground operations on the road system, and the use of basic road-test instrumentation were shown in the second picture.

"The Open Road," a sound color moving picture presented through courtesy of Bethlehem Steel Co. was an excellent presentation of highway construction in all its phases. The prize-winning sound color moving picture, "Gunning the Flyways," shown through courtesy of Remington Arms Co., was a spectacular film of wild fowl hunting in the United States and Canada.

There were two industry luncheons, the annual cocktail party and buffet dinner, and the top social function concluding the convention was the annual reception and banquet. Past president J. Reid Callanan presided for the greeting luncheon at which Milton Bacon, philosopher and humorist, presented a humorous and inspiring talk entitled "Watch Yourself Go By." Warren C. Rowe, Rowe Contracting Co., Malden, Mass., presided for a general luncheon which featured an excellent talk, "Communism as I Saw It" by Clayton Rand, editor, author and columnist of Gulfport, Miss., and the presentation of the N.C.S.A. safety awards by C. A. Gustafson, Callanan Road Improvement Co., chairman of the N.C.S.A. accident prevention committee. Mr. Rand's talk was of an inspiring nature and appealed to his audience as representing clear American thinking. He has been in Communistic Yugoslavia and, as a result, could pinpoint influences in this country that could have dangerous implications if not arrested.

President H. C. Krause presided for the annual banquet at which Caskie Stinnett, humorist and raconteur, New York City, spoke on the subject "Humor is a Funny Thing and We Can All Use a Laugh."

Other meetings included the annual business meeting of the Manufacturers Division which was at a luncheon, and a dinner meeting of the accident prevention committee. Special events for the ladies were a get-acquainted tea and a breakfast and fashion show at New York's famous B. Altman and Co. store.

New board of directors of the Manufacturers' Division, N.C.S.A. Top row, standing, left to right: C. S. Weber, Thew Shovel Co.; R. M. Dickey, Bucyrus-Erie Co.; A. E. Schneider, Stedman Foundry & Machine Co.; H. R. Harrington, Goodyear Tire & Rubber Co.; W. A. Rundquist, Pioneer Engineering Works, Inc., G. H. Woodland, Chain-Belt Co. Middle row, left to right: D. McM. Blackburn, Hendrick Manufacturing Co.; H. W. Newton, Barber-Greene Co.; R. D. Ketner, General Electric Co.; J. Craig McLanahan, McLanahan & Stone Corp.; G. C. Holton, American Cyanamid Co., and W. E. Collins, Jr., Atlas Powder Co. Seated, left to right: L. A. Eiben, Northern Blower Co.; Wayne W. King, W. S. Tyler Co.; Irwin F. Deister, Deister Machine Co.; J. R. Boyd, administrative director, N.C.S.A.; and B. R. Maloney, E. I. du Pont de Nemours & Co., Inc.

Directors' Meeting

Officers and members of the executive committee were elected at a meeting of the board of directors on Sunday preceding the convention sessions. Attendance at this meeting was excellent with 39 of 46 directors present. Administrative director, J. R. Boyd, discussed membership to the directors and reported the association to be in excellent financial shape. A motion was passed to send an appropriate telegram to honorary member Harold Williams, who was critically ill.

Officers

Horace C. Krause, president, Columbia Quarry Co., St. Louis, Mo., was re-elected president of N.C.S.A. Elected to the executive committee, in addition to Mr. Krause who is chairman, were J. Reid Callanan, Callanan Road Improvement Co., South Bethlehem, N.Y.; T. C. Cooke, Lynn Sand and Stone Co., Swampscott, Mass.; Wilson P. Foss, III, New York Trap Rock Corp., New York, N.Y.; S. P. Moore, Concrete Materials and Construction Co., Cedar Rapids, Iowa; Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio; W. S. Weston, Jr., Weston & Brooker Co., Columbia, S.C.; and W. F. Wise, Southwest Stone Co., Dallas, Texas. Otho M. Graves, chairman of the convention program committee, was re-elected an honorary member of the executive committee, and Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind., re-elected chairman of the Manufacturers Division, is the Division's representative on the executive committe of N.C.S.A.

James Savage, Buffalo Crushed Stone Corp., Buffalo, N.Y., was re-elected treasurer. Administrative di-

Official session of the N.C.S.A. Board of Directors

Seated clockwise around the table are members of the accident prevention committee: S. B. Fleming, New York Trap Rock Corp.; H. H. Kirwin, Eastern Rock Products, Inc.; H. C. Krause, Columbia Quarry Co., president; B. G. Gay, administrative assistant; C. A. Gustafson, Callanan Road Improvement Co.; H. F. Yetter, General Crushed Stone Co.; H. E. Rainer, Federal Crushed Stone Corp.; and J. R. Boyd, administrative director, N.C.S.A.

rector and secretary, J. R. Boyd, engineering director A. T. Goldbeck and field engineer J. E. Gray were also re-elected. The board of directors for 1953 had been previously elected as were the regional vice-presidents. Regional vice-presidents are Warren C. Rowe (New England), Bruce S. Campbell (Eastern), A. W. McThenia (Central), L. J. Boxley (Southeastern), A. J. Cayia (Northern), S. P. Moore (Midwestern), and E. Eikel (Southwestern). Bruce G. Woolpert, Granite Rock Co., Watsonville, Calif., was chosen at the New York meeting to replace Anna R. Wilson who is no longer identified with the crushed stone industry.

Representing the Manufacturers Division on the N.C.S.A. board are Irwin F. Deister; Wayne W. King, W. S. Tyler Co., Baltimore, Md.; and J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg, Penn.

The complete board of directors comprise Horace C. Krause (chairman), G. A. Austin, O. E. Benson, L. J. Boxley, H. H. Brandon, J. Reid Callanan, Bruce S. Campbell, W. N. Carter, A. J. Cayia, H. A. Clark, T. C. Cooke, A. F. Aggleston, E. Eikel, Wilson P. Foss, III, Arthur Goff, Otho M. Graves (honorary, executive committee), R. G. L. Harstone, J. L. Heimlich, N. E. Kelb, J. C. Lanber, G. D. Lott, Jr., M. E. McLean, A. W. McThenia, S. P. Moore, Verne C. Morgan, John H. Odenbach, J. V. Owens, W. T. Ragland, Jr., H. E. Rainer, Russell Rarey, R. S. Reigeluth, J. A. Rigg, Warren C. Rowe, W. R. Sanborn, R. E. Sansom, James Savage, Nelson Severinghaus, Margaret McD. Smith, O. M. Stull, F. B. Thatcher, W. S. Weston, Jr., D. L. Williams, W. F. Wise, Bruce G. Woolpert and A. L. Worthen.

Honorary members are F. O. Earnshaw, H. E. Rodes, Stirling Tomkins and Harold Williams.

Business Conditions

Following president Krause's greetings in the opening general session, past-president G. A. Austin announced the results of the elections. Mr. Krause then summarized reports by the regional vice-presidents on business conditions during 1952 and the outlook for 1953. Each regional vice-president had submitted a report in advance which was summarized from a compilation submitted to him from members in his region.

Mr. Krause covered the reports very briefly. Volume of business in 1952 was, with few exceptions, higher than in 1951. The price level in the United States was about the same, comparing the two years, but in some instances prices were lower. Price controls were given as the principal reason for price stabilization. In Canada the price level had increased about five cents per ton.

As to the relation of demand to capacity, Mr. Krause said that plants as a rule had been required to operate at capacity in 1952. Not much change as to distribution of sales according to use is expected in 1953. In the case of operations in metropolitan areas, building construction takes from 40 to 50 percent of the production, highways 25 percent and 10 to 15 percent of sales is for railroad ballast. The balance is for miscellaneous uses. From 40 to 60 percent of the output from operations in rural areas is used for highway construction. A slight increase in tonnage is expected in 1953.

Considerable added capacity was reported in all areas during 1952 due to the expansion of existing plants and the building of new plants.

Engineering Director's Report

Engineering director A. T. Goldbeck termed his report as one devoted to "straws in the wind." He discussed technical matters and trends that likely will affect the industry. In treating specifications, he called attention to some of the recent thinking reflecting in A.S.T.M. standards which are important because of A.S.T.M.'s influence on other specifying bodies.

Currently, an innovation is recognition of the alkali-aggregate reaction in tentative specifications. This reac-

Luncheon of the Manufacturers Division

tion, between the alkalis in cement and certain siliceous aggregates like those with opal, was described as one that sets up internal pressures in the concrete that result in map cracking and failure. Thus it would be preferred that aggregates be selected for concrete which are free of objectional constituents, the alternative being to use low alkali (.6%) cements or inhibitors like fly ash. Certain aggregates now used could be considered unsuitable under such a specification. Mr. Goldbeck said that cement composition has an important bearing on the problem and must be considered in the approach to solving the problem of alkali aggregate reaction.

The Los Angeles rattler abrasion loss has been established at a limit of 50 percent by A.S.T.M. and gradation requirements still conform with Simplified Practice Recommendations. No mention is made of flat and elongated particles in the newer specifications except that aggregates be free from injurious amounts.

Prestressed concrete was touched upon briefly as a rapidly growing development which makes economical use of concrete materials and which may affect the crushed stone industry. Crushed stone because of its favorable strength and rigidity properties should prove very suitable in attaining the high strengths and other properties required of prestressed concrete, he said.

One of the problems of great concern to some producers is complaints that certain stone sands when used in pavements contribute to slippery surfaces. Wear of the particles is the cause in such cases and it is considered that a coefficient of wear less than 0.4 is undesirable for such use. A substitution of 50 percent by weight of siliceous aggregate has been proved beneficial where this is a problem with non-siliceous aggregates.

Group of New York Trap Rock Co. officials with their wives at banquet

The need for greater use of granular sub-bases for pavements was discussed. Such graded materials must be economical for quantity use and are needed for concrete as well as bituminous roads, he said, in handling heavy traffic. There are two schools of thought, he said, one of which is to have dense, impermeable base courses whereas the other is to have an open gradation. The drainable types, such as used for the Pennsylvania Turnpike, carry water to the ditches whereas the dense type retains water underneath and contributes to capillary action.

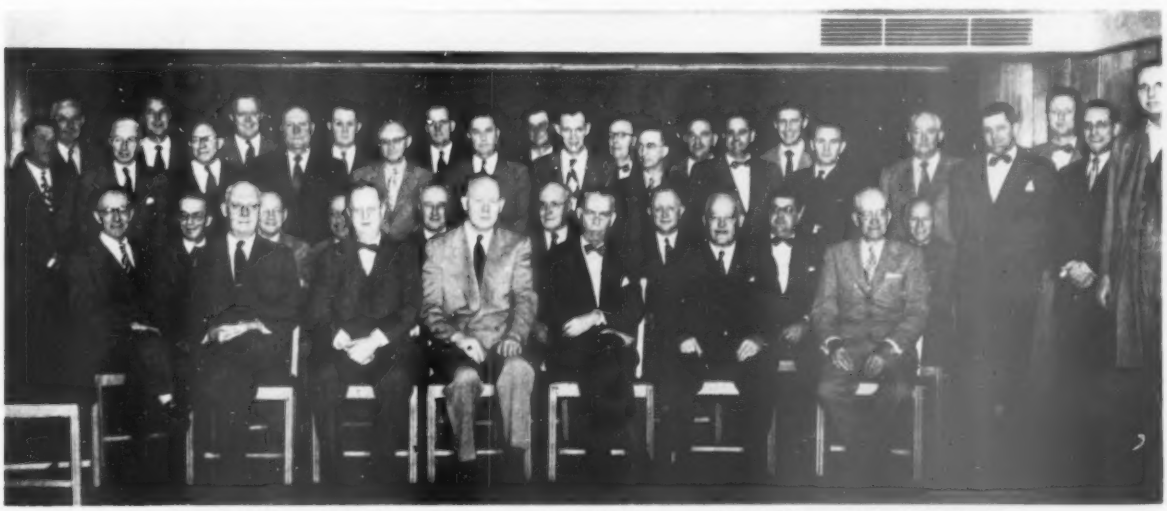
In the field of railroad ballast the trend continues to smaller sizes below ¾ in. whereas 2½ in. was a common top size not long ago. The reason for the trend is to obtain a smoother road-bed. The Los Angeles rattler test for abrasion is under investigation by the A.R.E.A. and may soon no longer be considered adequate. The railroads are attempting to set up standards for ballast based on simulated load applications and the result may be more stringent requirements, particularly with respect to cementing values, as they interfere with drainage.

Mr. Goldbeck then commented on the outlook for the industry in 1953. He predicted a larger volume of construction if general business continues good. Predicted volume of construction, of $33⅓ billion, will exceed the 1952 volume. Whereas industrial construction will decline, he said, public works construction will be greater particularly for hospitals and military building. A $3 billion outlay for highways was predicted.

Mr. Goldbeck concluded with comments on the fifth short course which drew 101 registrants from 37 member companies; 61 engineers and representation from six highway departments.

Field Engineer's Report

Field engineer J. E. Gray departed from the customary practice of pre-



One of the largest delegations to the convention was this big group of General Crushed Stone Co. officials

Horace G. Krause, president of N.C.S.A.

senting an annual report that is in the nature of a review, to present a detailed discussion of fine aggregate for bituminous concrete with emphasis on the suitability of screenings for the purpose. His paper was entitled "Current Practices in Use of Quarry Fines in Bituminous Concrete." The problem of supplying suitable fines for such mixes is one that is troublesome.

Mr. Gray started out by telling of specific instances where the use of screenings had resulted in bad performance of some sections of bituminous concrete roads. Segregation was responsible in the cases cited. On one section of road discussed, there were some rough places where there was an excess of fines caused by segregation. In another instance, segregation had resulted in parts of the pavement being open or porous, resulting in brittleness and lack of toughness and durability. Thus, certain stone screenings had been responsible for some unsatisfactory performance.

Mr. Gray discussed three fundamental approaches to the problem of meeting specifications. The first one described is that used by the Corps of Engineers and some highway departments, termed as a "grading band within a specification." The method consists of setting up a grading specification for the aggregate, which may have normal ranges in each size. Samples of the aggregate proposed for the job are tested for gradation and, if they comply with specifications, mixes are designed. If the mixes, when tested, meet design criteria for stability, density and flow, the gradation of the aggregate used becomes a part of the specifications within very narrow tolerances. There is no deviation from the job mix formula once it is established, the job mix range actually becoming the specification. An example of such an aggregate requirement was given as shown in the table, above.

Sieve Size	Specification	Assumed Aggregate Gradation	Job Mix Gradation Range
	Total Per Cent Passing		
¾ in.	100	100	100
½ in.	86-100	92	88-96
⅜ in.	78-90	85	81-89
No. 4	60-73	68	64-72
No. 10	43-57	50	47-53
No. 20	29-43	35	32-38
No. 40	19-33	27	24-30
No. 80	10-20	16	13-19
No. 200	3-6	4	3-5

With this method of control, any type of fine aggregate may be used whether it be screenings, stone sand, natural sand or a combination.

The second method permits the use of screenings in bituminous concrete if the mix conforms with the design criteria. Several states use the method, of which Texas is the outstanding example. The design criteria for hot-mix asphaltic concrete, type D, is an optimum density of 96 percent with limits of plus or minus 2 percent (minimum 94 percent, maximum 98 percent) and a Hveem stability of 35 minimum. Specifications for the aggregate require ½-in. maximum size with 50-65 percent retained on the No. 10 sieve (coarse aggregate) and a dust content of 2-10 percent (minus 200 mesh).

It is common practice to use some natural silica sand ("blow sand") mix, which is high in the 40-80 and 80-200 mesh sizes, and which produces a more workable mix. Its use is not required but the design criteria of 96 percent optimum density generally necessitates its use. In general, mixes of such types consist of 60 percent coarse aggregate, 25 percent screenings and 15 percent blow sand. A typical combination complying with the specifications was given as follows:

AGGREGATE COMPOSITION FOR BITUMINOUS CONCRETE USING STONE, SCREENINGS, AND SAND

Sieve Size	Stone		Screenings		Blow Sand		Specification	Combined Analysis
	Total %	X 60%	Total %	X 25%	Total %	X 15%		
⅜ -½"	1.0	0.6					0-3	0.6
½ -¼"	56.0	33.6					25-45	33.6
¼"-10	41.0	24.6	1.8	0.4			15-35	25.0
							50-65	59.2
10-40	1.0	0.6	54.7	13.7	0.5	0.1	0-25	14.4
40-80	0.5	0.3	17.5	4.4	50.2	7.5	5-25	12.2
80-200	0.5	0.3	12.0	3.0	45.8	6.9	5-25	10.2
-200			14.0	3.5	3.5	0.5	2-10	0-7
	100.0	60.0	100.0	25.0	100.0	15.0		

In the foregoing combination the screenings bulk between the No. 10 and No. 40 sieves and the blow sand supplies the deficiency in the 40- to 200-mesh range. Dust in the screenings is so diluted in such a combination that variations in the amount in the final mix are of no consequence. Usually, the screenings for such a specification are a product of secondary crushing operations. No fine aggregates are permitted to be blended in stockpiles but each must be fed separately to the cold elevator.

Probably the greatest factor contributing to the successful use of screenings, said Mr. Gray, has been the amount of coarse aggregate used. The Texas mix discussed had 60 percent coarse aggregate. The amount of coarse aggregate that can be used depends upon its size. Mr. Gray showed tables of specifications in use in California, to illustrate the effect of maximum size on the amount of fine aggregate in dense graded bituminous concrete. The No. 8 sieve was the division between coarse and fine gradation. Taking the average of the specifications, the average amount of fine aggregate to be used was as follows:

Maximum Size	Total Passing No. 8, (%)
No. 4	77
⅜ in.	56
½ in.	51
¾ in.	44

As the maximum size increases, the percentage of fine aggregate required decreases, thereby reducing the effect of variation in the fine aggregate.

Practice in Ohio was selected as an outstanding example of the third method discussed, in which manufactured stone sand is used as the fine aggregate. The Ohio Highway Department is a large user of bituminous concrete and has developed a procedure which gives excellent results.

Quarry screenings are not permissible but manufactured sand is used extensively. The gradation requirements are as follows:

Passing	Retained	Per Cent
No. 4	—	100
4	6	0-5
6	8	0-10
8	16	15-40
16	50	25-60
50	100	5-35
100	200	2-10
200		0-7

In the manufacture of stone sand, all the material passes a No. 6 sieve which is the dividing line between coarse and fine aggregate. This small top size results in a stone sand free from troublesome segregation, and the wet process is used in production so that the amount of minus 200-mesh material is also reduced and readily controlled.

The effect of moisture is also considered as an aid to minimizing segregation. In processing, the stone sand is put through classifiers to control the minus 200-mesh fraction and is then stockpiled until the moisture content is reduced to 4 or 5 percent.

With a moisture content so low, there is no flow of water downwards in the stockpile and the fine particles adhere to the coarser particles so that, when a shovel digs into a pile of stone

sand and there is some caving, the appearance of the entire pile is one of uniform gradation.

Rather than have a rigid job mix formula, practice in Ohio is to approve, for gradation, stockpiles of both coarse and fine aggregate. Once approved, the producer is relieved of responsibility for gradation. The engineers establish the job mix formula from samples of materials the contractor proposes to use. Requirements on the 20, 40, 80 and 200-mesh series in the job mix formula are not set up when these requirements cannot be enforced.

Administrative Director's Report

J. R. Boyd, administrative director, gave a brief annual report of the activities of his office since the membership had been kept informed of his activities throughout the year through regular administrative letters. He gave a very favorable report on income and financial status; and enumerated the meetings the various committees, the board of directors and executive committee held throughout the year.

Mr. Boyd was optimistic about the change in Washington to an administration which will be much more sympathetic to business than the country has had in many years.

How to Sell

"Little Things that Make the Sale" was the subject of an interesting and humorous talk on selling methods in a buyers' market by Harry Bowser, director of sales education, Sloane-Blabon Corp. Mr. Bowser pointed out that salesmanship is challenging and the factors governing it are rapidly changing. Salesmen must come up with new ideas which must be promoted with enthusiasm. The modern salesman must be better trained. Little things very often are important in closing sales, and human relations are vitally important. He suggested that the customer must be given a chance to tell the salesman something—a sales talk must have "landings." The more a salesman understands people, the more successful he will be. Another thing a good salesman does is to help a customer to buy. He wants information to clear up his confusion. Mr. Bowser said that you have to understand selling in the era in which we live—people want something new and different. Many sales are lost just because the salesman fails to ask for the order after his sales talk has been made. In a highly competitive sales era, it is often the little things that influence buyers.

Committee Reports

W. T. Ragland, Jr., manager, Superior Stone Co., presided at the morning session on Tuesday. The session opened with the showing of the sound, colored moving picture titled, "The Open Road." This entertaining and educational picture, which was presented through the courtesy of Bethlehem Steel Co., emphasized the very important part played by the steel industry in highways and industrial construction.

Left to right: Mr. and Mrs. John Kawaske, Keith Callanan and Charles Callanan

After the picture had been shown, Chairman Ragland called for the presentation of committee reports. M. E. McLean, chairman of the auditing committee, presented his report which was accepted unanimously. Norman E. Kelb reported as chairman for the membership committee that only one new member had been obtained during the past year. Mr. Kelb expressed the view that membership could be increased at least 20 percent if a determined effort be made. Clarence A. Gustafson, chairman of the accident prevention committee, presented some interesting accident statistics covering the 12-month period from December 1, 1951 through November 30, 1952. The resolutions committee report presented by Warren Rowe expressed the pleasure of the association for the services offered by the Hotel New Yorker and the New York Visitors' Bureau.

Percentage Depletion

Russell Rarey, chairman of the percentage depletion committee, gave his progress report on the status of legislation and the regulations which have been set up. Mr. Rarey said that while the first legislative battle had been won, the industry should not be complaisant. He expressed appreciation of those members of Congress who had lent support to the industry's plea for percentage depletion allowances, and urged industry members to express their personal appreciation to members of Congress in their own districts. He referred to the unfortunate wording of the 1951 act under which members' accounting systems that were not set up on a financial calendar basis were discriminated against so that many were not able to take advantage of the allowances for periods up to 11 months. Up to 70 percent of the membership expressed the belief that an effort should be made to reopen the question. However, it was decided that it would be extremely difficult to amend the law to bring relief. It was decided by the committee that each company interpret the law to meet its own situation and that no formal interpretation of the regulations would be attempted by the committee. About 60 industries are now included under the law. A resolution was drawn up by the committee urging fair depletion allowances.

Ed. Nunan, Federal Crushed Stone Corp., left, and J. R. Thoenen, U. S. Bureau of Mines, were caught swapping some yarns

Stabilized Aggregate Base Construction

Charles E. Proudley, chief materials engineer, North Carolina State Highway and Public Works Commission, gave an interesting paper on a comparatively new pavement design that offers an increasing market for producers. The pavement comprises a 14-in. stabilized aggregate base course and a double surface treatment wearing surface. The contract called for 235,955 sq. yd. of base course at $1.91 per sq. yd. completed in place and bituminous surface treatment at 33¢ per sq. yd. Aggregate consisted of four parts of crushed stone from the Midland quarry of Superior Stone Co. and one part selected sandy topsoil. Accurate control of gradation of aggregates, the addition of a constant percentage of water for compaction, and the blending of all ingredients in a continuous pug mill mixing operation are features of this job. Calcium chloride

Mr. and Mrs. E. Lee Heidenreich

James H. Grove, Jr., M. J. Grove Lime Co., left, with Dexter Bullard, New York Trap Rock Corp.

J. V. Owens, Eastern Rock Products, Inc., left, with Irwin F. Deister, chairman, Manufacturers Division

A father and son combination, J. Reid Callanan and son Charles

was added to the top course.

Stone was run-of-crusher passing 2-in. mesh from which some of the minus ½-in. size had been removed to give the most desirable gradation when combined with the binder soil. It was found that a 4:1 mix gave a weight per cu. ft. of 142 lb. when compacted.

Specifications for gradation of the stabilized aggregate and the grading actually used on the job were as follows:

Passing	Percentage	Actual Grading
2"	100	100 percent of aggregate passed
1"	75-90	91 percent passed, which is 1 percent out of the limits but considered immaterial
½"	60-75	65 percent was the average
No. 4	45-60	50 percent average with variations between 47 and 53 percent
No. 40	15-30	Average was 20 percent

No. 200 not less than 5 percent of the total aggregate nor more than two-thirds of the amount passing the No. 40 sieve; job average was 9 percent although as much as 13 percent would have been permitted.

Vibrating pan proportioning equipment was used for stone, soil and calcium chloride, but the belt on which the blend was carried to the pugmill was watched constantly to be sure that there would be no variance in the materials. After proportioning, no stockpiling was permitted. The material was spread in four layers; the first two layers were 5 in. loose compacted to 3¾-in., and the third layer was 4⅔ in. loose compacted to 3½ in., and the top layer, in which 7 lb. of calcium chloride per ton was incorporated, was placed 4 in. loose which gave 3 in. compacted. The quarry stone is identified as a slate with a specific gravity of 2.8 and a Los Angeles wear of about 22 percent. There have been no signs of base failure since the road was open to traffic since September, 1952. Mr. Proudley showed a moving picture of the mixing operation at the quarry and the road construction work.

In the discussion which followed, Mr. Proudley answered the question as to the amount of ½ in. removed from the crusher run by stating that it was designed to give a smooth curve in gradation but he could not give any figure. He said that stone screenings could be substituted for topsoil if the voids could be held to less than 18 percent. Pug mill mixing was approximately 10 sec. There is no pumping with this type of road, and it is considered superior to water-bound macadam. Bruce Campbell reported on a similar job that 3½ in. maximum size stood up better than 1½ in. Fifty percent of the material was minus 1 in.

Otho Graves offered a resolution expressing appreciation of the association for the work of Russell Rarey and Horace Krause and members of the committee in securing depletion allowances for the industry.

Legislative Outlook

Wilson P. Foss, III, presided at the afternoon session on Tuesday. He introduced John F. Lane of Gall, Lane and Howe, general counsel of the association, who reviewed the legislative outlook. Mr. Lane said that President Eisenhower's address to the nation had been received with optimism. He commented on the narrow margin of control held by the republicans in Congress, and the question of teamwork with the President. Turning to the question of controls, he said that President Eisenhower favored expiration of controls on April 30 but many of them may be removed by executive order. Materials controls will be allowed to expire except war-scarce products, but Sen. Capehart's bill for standby controls may be introduced. He reviewed the possibility of a tax reduction with particular reference to the Reed bill, but he believed that the President would be vary cautious in advocating any tax reduction at this time. One of the most important legislative actions will be the amendments to the Taft-Hartley bill. He referred to a bill now before Congress that would require men to join a labor union within seven days of employment. While the bill ostensibly covers only the construction industry, it may not necessarily exclude the stone industry.

D. W. Williams, chief, natural resources section, Bureau of Internal Revenue, gave an informal review of the application of the percentage depletion regulations to the crushed stone industry. His talk served to clear up certain misunderstandings that have arisen.

Employer-Employe Relations

L. R. Boulware, vice-president in charge of employe and plant community relations, General Electric Co., outlined some of the objectives of his company in establishing better employer-employe relations. He listed four major points in this plan: (1) to do right voluntarily in setting up fair pay and working conditions; (2) to do right voluntarily in the matter of employer-employe relations; (3) to strive to have the community understand the company and its policy; and (4) the dissemination of economic education. Mr. Boulware pointed out that collectivists (communists, socialists, etc.) want big government and the limitation of individual responsibility and freedom.

Safety Committee

The accident prevention committee held a dinner meeting to discuss the 1952 record and consider ways to improve the record for the industry. During the year 1952, there were reports of accidents received from 92 member plants. These totalled 280 accidents with 10 fatalities, 6 permanent partials, 246 temporaries and 18 no lost-time accidents. There were about

9,886,600 man-hours worked by the reporting plants and a total of 4550½ days lost (Dec. 1, 1951 through November 30, 1952.).

Back injuries were still predominating, so emphasis was put on teaching men to lift properly. Eye, head, toe and foot injuries were also high and it was agreed that most of them could have been prevented by the use of goggles, hard hats and safety shoes.

This past year the committee was successful in getting most reporting plants to report man-hours of exposure, which is a good yardstick to measure comparative performance.

The committee has taken on an enlarged program of activities, one phase of which consists of the writing of articles on safety by members of the committee. The first of a series will be an article on safety covering conveyors.

C. A. Gustafson, chairman of the N.C.S.A. accident prevention committee, presented the N.C.S.A. safety awards at the general luncheon of the association. The *Explosives Engineer* trophy was awarded to A. W. Heitman, superintendent of the Inland Lime & Stone Co. quarry, Gulliver, Mich., for having worked 808,389 man-hours in 1951 without lost-time injury. Certificates were awarded to other quarries which had no lost-time injuries in 1951. The winners and pertinent data were published in ROCK PRODUCTS, October, 1952, pp. 146 and 148.

Winners of N.C.S.A. safety contest. Standing, left to right: E. P. Snyder, safety supervisor, Security Quarry, North American Cement Corp., Hagerstown, Md.; J. G. Wilson, general superintendent, Cedar Hollow Div., Warner Co., Bridgeport, Penn.; Fred Warner, general superintendent, Bell Underground Limestone Mine, Warner Co., Bellefonte, Penn.; Harvey P. Jones, superintendent, Auburn Quarry, General Crushed Stone Co., Auburn, N.Y.; Merl Price, superintendent, LeRoy Quarry, General Crushed Stone Co., LeRoy, N.Y.; Oliver C. Dietschler, superintendent, Jordanville Quarry, General Crushed Stone Co., Jordanville, N.Y. Seated, left to right: John H. McKernan, superintendent, Middlefield No. 1 Quarry, New Haven Trap Rock Co., Middlefield, Conn.; Charles F. Bass, superintendent, Plainville No. 4 Quarry, New Haven Trap Rock Co., Plainville, Conn.; A. W. Heitman, general superintendent, Port Inland Quarry, Inland Lime and Stone Co., Gulliver, Mich.; and Edgar Z. Cole, superintendent, Rock Hill Quarry, General Crushed Stone Co., Quakertown, Penn.

Manufacturers' Division

Manufacturers' Division held a luncheon session to elect officers and directors, and to transact business of the Division. Horace Krause, president of N.C.S.A., expressed the thanks of the association for the whole-hearted support it has received from its associate members. Chairman, Irwin Deister detailed the 1952 activities and discussed briefly the 1954 exposition which will be held in Chicago.

Wayne King, chairman of the membership committee, reported a membership of 101 companies. Larry Eiben, chairman, read the resolutions, thanking Messrs. Boyd, Krause and Deister particularly for their efforts in making the convention a success, and expressing appreciation to the N.C.S.A. for its interest in the Manufacturers' Division. Resolutions were also read expressing sorrow in the deaths of John Rice, Sr., General Crushed Stone Co., Easton, Penn., and C. S. Huntington, Link-Belt Co., Chicago, Ill.

Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind., was re-elected chairman of the Manufacturers' Division. Vice-chairmen are L. A. Eiben, Northern Blower Co., Cleveland, Ohio, Wayne W. King, W. S. Tyler Co., Cleveland, Ohio, B. R. Maloney, E. I. du Pont de Nemours & Co., Inc., New York, N.Y. Members of the executive committee are Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind., chairman; L. A. Eiben, Northern Blower Co., Cleveland, Ohio; Wayne W. King, W. S. Tyler Co., Cleveland, Ohio; H. C. Krause, Columbia Quarry Co., St. Louis, Mo., (president, N.C.S.A.); B. R. Maloney, E. I. du Pont de Nemours & Co., Inc., New York, N.Y.; J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg, Penn.

Members of the board of directors for 1953 are Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind., chairman; D. McM. Blackburn, Hendrick Manufacturing Co., Milwaukee, Wis.; W. E. Collins, Jr., Atlas Powder Co., Wilmington, Del.; R. M. Dickey, Bucyrus-Erie Co., South Milwaukee, Wis.; C. R. Dodge, Northwest Engineering Co., Chicago, Ill.; L. A. Eiben, Northern Blower Co., Cleveland, Ohio; G. P. Fenn, Caterpillar Tractor Co., Peoria, Ill.; G. D. Fraunfelder, Easton Car & Construction Co., Easton, Penn.; J. W. Hardesty, Construction Equipment Div., Baldwin-Lima-Hamilton Corp., Lima, Ohio; H. R. Harrington, Goodyear Tire & Rubber Co., Inc., Akron, Ohio; G. C. Holton, American Cyanamid Co., New York, N.Y.; G. H. Keppel, C. G. Buchanan Crushing Machinery Div., Birdsboro Steel Foundry & Machine Co., Birdsboro, Penn.; R. D. Ketner, General Electric Co., Schenectady, N.Y.; Wayne W. King, W. S. Tyler Co., Baltimore, Md.; K. F. Lange, Link-Belt Co., Chicago, Ill.; B. R. Maloney, E. I. du Pont de Nemours & Co., Inc., New York, N.Y.; J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg, Penn.; H. W. Newton, Barber-Greene Co., Aurora, Ill.; L. A. Rhodes, Jeffrey Manufacturing Co., Columbus, Ohio; W. A. Rundquist, Pioneer Engineering Works, Inc., Minneapolis, Minn.; A. E. Schneider, Stedman Foundry & Machine Co., Inc., Aurora, Ind.; C. Darrell Smith, Joy Manufacturing Co., Pittsburgh, Penn.; V. L. Snow, Euclid Road Machinery Co., Cleveland, Ohio; Gilfrey Ward, American Manganese Steel Div., American Brake Shoe Co., Chi-

A scene at the luncheon at which N.C.S.A. Safety Awards were presented

Left to right: Arthur C. Butler, Director of the National Highway Users Conference, B. D. Tallamy, superintendent, New York Department of Public Works, convention speakers; and A. L. Worthen, president of New Haven Trap Rock Co., presiding at one of the sessions

cago, Ill.; C. S. Weber, Thew Shovel Co., Lorain, Ohio; and G. H. Woodland, Chain Belt Co., Milwaukee, Wis.

Project—Adequate Roads

A. L. Worthen presided at the Wednesday afternoon session. The first speaker was Arthur C. Butler, secretary of the National PAR Committee, and director of the National Highway Users Conference who told about the work of the PAR committee (Project—Adequate Roads) in promoting better roads. He said that for the first time in history many divergent groups are now working together on a program of obtaining adequate highway funds with the maximum use of highway revenue. The present highway tax dollar is only worth 46.8¢ compared to the 1941 highway dollar due to inflation. Although highway expenditure in 1952 for all purposes was nearly five billion dollars, it is actually about half a billion less than was spent in 1938. There are 74 percent more motor vehicles in America today than there were at the end of the war, and it is expected that by the end of 1953 there will be 56,500,000 vehicles in operation or one vehicle for every three persons in the United States. Mr. Butler said that 24 states now have constitutional amendments prohibiting diversion of highway tax revenues to purposes other than for highways. He urged the repeal of federal automotive excise taxes which brought in two billion dollars last year and leave this field of taxation to the states for highway purposes. A trend in the right direction, he said, is the use of sufficiency ratings by state highway departments to provide a continuing inventory of highway needs and a system of priority for construction and maintenance work. He said that 29 states have now adopted this system.

C. A. Gustafson, chairman, accident prevention committee of N.C.S.A., left, presenting Explosives Engineer safety trophy to A. W. Heitman, general superintendent, Port Inland Quarry, Inland Lime and Stone Co., Gulliver, Mich. This quarry was the winner of the 1951 safety competition with an outstanding record of 808,389 man-hours worked without a lost-time accident

Trend Toward Throughway Construction

B. D. Tallamy, superintendent, New York Department of Public Works, in his informal talk outlined the history of transportation from the days of the canoe to the toll highways of today. He said the first toll highway was built in the administration of George Washington. It was built by private interests largely of crushed limestone, extended from Philadelphia to Lancaster, and the toll was 1¢ a mile. It was very successful financially. Mr. Tallamy said that the big road construction program of the 20's caught up with the increase of vehicles, but in recent years the nation's highway program has fallen behind traffic increases. It would take more than $2,800,000,000 annually for the next 10 years to catch up with traffic needs.

He said that the old method of highway construction drew industries, retail business and restaurants to areas contiguous to the highway which restricted the full use of the road due to interfering traffic movement. The new limited access express highways do not have interrupting traffic to slow up movement. Mr. Tallamy said that the cost of bringing older highways to a state of adequacy would be prohibitive and states have turned to the toll expressways to solve the problem. Thirty states now have toll highways or plans under consideration. He suggested that states should guarantee highway toll authority financing to reduce the cost. Turning to the New York Throughway construction, Mr. Tallamy said that 150 miles will be completed this year. The first financing was completed by the sale of $60,000,000 in two-year notes at 1.1 percent interest. He suggested that the use of federal aid funds be explored as a means of stimulating toll highway construction which may be applicable to the federal interstate highway system.

Alfred W. Tobin, left, secretary of the New York State Crushed Stone Association, and N. Pallette, Pallette Crushed Stone Co.

Warren C. Rowe, Rowe Contracting Co., poses for a shot with C. A. Gustafson, The Callanan Road Improvement Co.

Robert Koch, executive secretary, National Agricultural Limestone Institute, left, chats with Clarence Munz, Eastern Rock Products

Production Problems Stimulate Discussion at Operating Sessions

BOTH operating sessions were extremely well attended. The first one had a panel of experts consisting of three authors of papers on selected subjects of current interest, who remained to answer all manner of questions shot at them. The subjects selected were chosen as a result of summarizing the results of a questionnaire sent to operating men during the past summer.

Heated Screens

"Heated Screens—Information as to Their Design, Application and Performance in Crushed Stone Plants" was the subject of a prepared paper by J. V. Owens, vice-president, Eastern Rock Products, Inc., Utica, N.Y. In his introduction, Mr. Owens commented on the large number of heating units being installed in the industry and said that it has now been proven that material which formerly blinded vibrating screens can now be screened.

He then described the principles by which a vibrating screen is heated, which consists of passing an electric current through the wires of the screen cloth. The wire cloth, bus bars and leads from the transformer form the electric circuit, which is completely insulated from the rest of the vibrating screen. Heating of the cloth is accomplished by the current-carrying wires running between opposite bus bars serving as the resistance. Assuming the bus bars to be at the edges along the screen side plates, the wires across the deck carry the current and the longitudinal wires pick up heat from conduction.

The transformer supplying the current is a single-phase dry type, the primary side being connected to the current source, and current is supplied the screen circuit within the range of 1000 to 4000 amp. The secondary voltage varies from 5 to 15 volts. Through the use of several taps in the transformer, the primary voltage may be varied to adjust the degree of heat in the wire cloth.

Blinding from moist stone is caused by fine particles adhering to the wires because of surface tension of the material and the building up of fine particles one on another. Heat in the wires causes the evaporation of the moisture at a rapid rate and the idea is to prevent particles from starting to adhere to the wires.

Temperature of heated wire cloth, running empty, is in the range of 100 deg. F. to 300 deg. F., the temperature required depending on the amount of surface moisture in the stone, rate of feed, rate of travel over the screen and the screen analysis. Range in size of wire opening that may be practical to heat varies from a 1-in. sq. opening to a 20-mesh opening but, as Mr. Owens pointed out, he has heard of successful sizing as fine as 80 mesh.

The speaker discussed the advantages and disadvantages of plain steel and stainless steel wire where heat is applied. Stainless steel has about double the resistance to current as plain steel which means that the same heating effect may be expected from stainless steel wire with half the current and double the voltage, as in plain steel wire. Thus the cost of conductor and bus accessories would be less for stainless steel wire, on top of better resistance to wear and corrosion. These advantages are offset by the high cost and scarcity of stainless steel wire.

According to the estimate of a manufacturer, the power cost for heating a 4- x 5-ft. screen is 45 cents per hr. at three cents per kwh., but Mr. Owens said that his company has a lower cost than that. Maintenance, according to his experience, need be no more than for unheated screens. Cost of heating equipment for a new 4- x 8-ft. screen is a little more than $1000 and, he said, heating equipment may be easily installed on existing screens by the average maintenance crew. Furthermore, he said that the high amperage, low voltage power does not create any hazard to safety.

Mr. Owens then referred to several installations which served to point up the advantages of screen heating. One case is the heating units on two 5- x 10-ft. Allis-Chalmers single-deck Ripl-Flo screens for making a $\frac{3}{8}$-in. separation, at the Stoneco plant of New York Trap Rock Corp. Feed to these screens is minus $\frac{3}{4}$-in. sq. mesh material at the rate of 75 t.p.h. to each screen. Prior to using heated screens it was impossible to make a satisfactory product over or through the $\frac{3}{8}$-in. cloth even under most favorable conditions. Now, a satisfactory job may be done except under very severe conditions of moisture content and ambient temperature.

General Crushed Stone Co., at Watertown, N.Y., has heating equipment for each bottom deck on two 4- x 12-ft. multiple-deck screens in the recrushing plant, which have 20-mesh, .014 dia. tinned mill cloth. One of these decks was operated without heat for a while, while waiting for delivery of the second heating unit, which gave a comparison. The heated screen was satisfactory while the other passed little or no material. Now, the two decks together are producing from 3 to 5 t.p.h. of minus 20-mesh material.

In the case of his own company, Mr. Owens said that fine screens in a dry-screening crushed limestone plant were frequently blinded. The problem was further aggravated because water sprays are in use to minimize airborne dust in compliance with a New York State industrial code.

The first heated deck was installed on a 4- x 8-ft. vibrating screen at a cost of $1100. Before this installation, the $\frac{1}{8}$-in. sq. mesh was frequently blinded and the $\frac{1}{4}$- to $\frac{1}{8}$-in. oiling stone product contained excess dust. Complaints from customers were serious, but the heated screens licked the problem.

The year following this installation, the plant was enlarged and a new 5- x 14-ft. heated screen was installed for the $\frac{1}{8}$-in. separation. Also, a 4- x 10-ft. "Hum-mer" heated screen was installed with 20-mesh cloth. Both installations have been successful and the sale of new products, including minus 20-mesh agstone, which were

Three of the leaders in operating session discussion. Left to right are Luther F. Miller, New York Trap Rock Corp.; Clarence Camp, II, Camp Concrete Rock Co.; and Nelson Severinghouse, Consolidated Quarries Corp.

formerly waste, has paid off the investment in less than three years.

Power cost for heating the 4- x 10-ft. Hum-mer screen is 16 cents per hour and, for the 5- x 14-ft. screen, 27 cents per hour. The only shutdowns due to heavy rains are caused by blinding on the ½- and ¼-in. cloth and not because of the heated cloth.

In the spring of 1951, a conversion to heating was made on the lower deck of a 5- x 14-ft. triple-deck screen at the Oriskany Falls plant. The ⅛-in. deck of this screen had been impossible to keep open because all material is treated with high pressure, low volume water and wetting agent sprays to hold down dust. The trouble has been almost completely eliminated to date and it is believed that added heat will eliminate blinding completely. Being able to screen out the minus ⅛-in. material has meant the ability to produce a more profitable product in this case.

Following Mr. Owen's paper, there was a question and answer period. In reply to a question as to whether heated air might be used, the reply was that it would not be as successful as electrical heating. It was brought out that the heat differential between a loaded and an unloaded screen is in the range of 80 deg. F. The moisture of the stone is changed very slightly, the object of screen heating being only to keep the wire openings clear.

Lubrication of bearings is no problem if the heated cloth be isolated from the screen proper. Perforated plate has not been heated. In answer to one question, it was said that stone with moistures as high as 10-15 percent has been successfully screened over 20-mesh cloth. The rate of feed to that screen has been as high as 15 t.p.h. It was recommended that complete heating units be purchased because such units would be a better job than one made and installed by a producer.

Safety

In a paper, "Mechanics of Establishing and Operating a Good Safety Program in a Small Operation," T. W. Jones, production manager, New Haven Trap Rock Co., New Haven, Conn., stressed particularly a safety dividend, or safety bonus plan, which his company has had in effect for 15 years with proved results in the reduction of accidents.

To start out his paper, Mr. Jones assumed that a crushed stone plant of 200 t.p.h. to 400 t.p.h. capacity, employing 15 to 40 men, or bituminous concrete plants, with 3 to 4 men, would fit into a small operation category. For that matter he said that the principles involved in his discussion would only vary as to degree as they be applied to large or small operations.

The first point brought out was that the safety program definitely belongs in the production department. To emphasize the degree of relation of safety to production, he cited Heinrich's ratio which states that the total cost of an accident itself is only one-fifth the total cost when loss of production due to damaged machinery, interruption of flow and other factors be taken into account. As an example, he said that if an accident cost $200, the total cost to the company is $1000 of which $800 represents loss in production. Even if the $200 cost for the accident itself is paid for by the insurance company, the producer pays the cost in the end. The Heinrich ratio is considered conservative by Mr. Jones, but it does bring out the close relationship of safety to production.

Regardless of the size of operation, it is essential that there be a safety man, in Mr. Jones' opinion, whether he be the president, engineer or office clerk and that individual must act, talk, think and live safety. He expressed his sympathy for the foreman who, too often, must take full responsibility for the safety program without being provided the necessary tools or adequate help.

The first step in starting any safety program, he stressed, is to get management interested in safety. If the president is safety-minded, as was the case in the New Haven Trap Rock Co., it is relatively easy to develop a sound program. A good start to create interest is to develop the Heinrich's ratio to which he had referred.

Setting off a blast at New York Trap Rock Corp. quarry, illustrating safety precautions

Mr. and Mrs. Alfred N. Foley, West Roxbury Crushed Stone Co.

Other suggested steps in starting a safety program were enumerated as follows:

1. Organize a safety committee to formulate safe practices, analyze accident reports and classify accidents.
2. Purchase safety equipment and provide safety glasses, shields, protective hats, respirators, gloves and safety shoes where needed.
3. Provide safety posters and payroll inserts.
4. Hold safety rallies at least once annually.
5. Safeguard equipment and provide safe walkways and passageways.
6. Establish and maintain good housekeeping throughout the plant. This builds good morale.
7. Join the Cement and Quarry Section of the National Safety Council.
8. Create a safety consciousness in every employe.

The latter point is considered of utmost importance, and the one thing that has done most to accomplish that goal, for New Haven Trap Rock Co., has been the safety dividend plan. Under this plan, every employe working on any one of the company payrolls is given one percent of his earnings made during a period in which that payroll group has accumulated 30,000 man-hours without a single lost-time injury. That dividend is called the plant bonus and everyone on the payroll gets it, as a bonus earned by the teamwork of the plant group itself.

In addition, individual effort is recognized by increasing the bonus to 1½ percent when an employe has been with the company three years and he has not suffered a lost-time injury during that period. If his employment has been for six years, he receives 2 percent if he has not had a lost-time injury for that period. If an employe has been with the company over six years but had a lost-time injury, say 3½ years ago, he

gets the 1½ percent bonus. In all cases no individual receives any bonus unless the plant bonus for the 30,000 man-hours first be earned.

It might require two years or more for plants with three or four men to accumulate the 30,000 man-hours whereas a plant with 45 men might reach the figure in just a few months, but the plan is predicated on the fact that there is a definite accident exposure for every man on the job. Wage rates being equal, employes would earn the same bonus whether they work in the smaller or larger plant. Those in the smaller plant would wait longer but receive a proportionately larger bonus.

As to the economics of the plan, Mr. Jones said that, while some may argue that a company should not have to pay for safety, safety is part of production, for which companies pay wages, and the bonus creates an incentive production plan. He mentioned two examples to prove the advantage. In one, the company pays the manual compensation rate but has several lost-time injuries including a couple of amputations and a fatality. The other pays out for compensation insurance on the retrospective rating plan, the minimum rate plus several safety bonuses, which total to what the first company paid out, but it had no lost-time injuries.

During the 15 years Mr. Jones' company has had the plan, there has not been a single year when the total paid out for compensation insurance and for safety bonuses would compare with the manual rate premium that the company might have had to pay. In effect, the plan amounts to sharing with the employes the savings effected by a good, safe, non-accident period of operation.

The difference between the manual rate in Connecticut and the minimum premium the company pays, assuming a good year without lost-time injury, is about $3.85 for every $100 of payroll remuneration whereas the average safety bonus is a little under 1½ percent.

In the retrospective plan there is a minimum and a maximum within which the company must work. For example, in assuming a $200,000 payroll and a $5 premium, the basic premium would be $10,000. The company's minimum is less than 25 percent of the basic premium and the maximum is about 155 percent, which would make the minimum premium $2500 and the maximum $15,500.

If the company has a no-accident year and pays safety bonuses, they would amount to $3000 which is 1½ percent of the $200,000 payroll. The minimum premium of $2500 plus the $3000 in safety bonuses would total $5500 or yield a net saving of $4500 over the basic premium. The saving would be $10,000 over the maximum if the safety program prevented a catastrophic year, he pointed out.

Portable, pneumatically-operated block-hole drill in action in granite quarry

Mr. Jones itemized the manual rates for other states and stated that he could not see why such a plan would not prove economically sound even in the states with far lower rates.

He then cited the safety records at various of the company's plants. One plant with 43 men had gone over 20 months without a lost-time injury. The company's asphalt plants have had only one lost-time accident which occurred in November, 1940. A comparison of the company's accident and severity rates with the national average is proving that a good job is being accomplished.

The fact that employes caution others found breaking safety rules is evidence that teamwork has been created and that they do not want to lose the bonuses. In conclusion, Mr. Jones said some plan should be undertaken to create safety consciousness, whatever it be, because the objective must be safety-mindedness throughout in order to reduce accidents.

The number of questions asked of Mr. Jones following presentation of his paper was gratifying evidence that interest in the subject of safety is growing rapidly. One question was on the definition of a lost-time accident. The reply was that a man must return for his next shift in order to avoid having a lost-time accident charged. Accidents that would result in injuries such as loss of a finger tip would be considered as lost-time even if the employe did return for the next shift.

In reply to a question as to whether carelessness might follow an accident, Mr. Jones said that that has not proven to be the case. On the other hand, the men become more determined than ever to become qualified for the re-instatement of the bonuses. Training programs are effective in creating safety consciousness said Mr. Jones in answer to another question. He has had no experience with men failing to report injuries for fear of losing the bonus; rather, the men apply for first aid in order to guard against having to stay away from work.

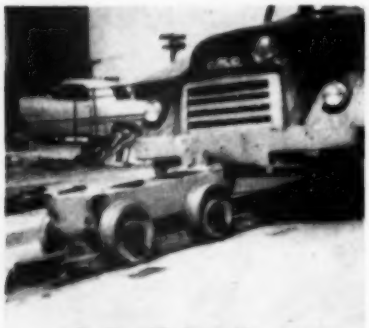
As to methods used to get men to use safety equipment, he said there are no compulsory rules and that it is a matter of persuasion. The unions have no objections to safety equipment; in fact it was brought out by chairman Dexter Bullard that unions endorse the use of such equipment.

In reply to another question, Mr. Jones said that the company does not penalize a man with a good safety record for accidents for which he could not be responsible; for example if there be a defect in a chain or other such equipment which contributes to an accident. As far as employes are concerned who make a habit of breaking the safety rules, the solution is to get rid of them. The company's bonus plan applies to all employes engaged in production except the superintendent of the plant. Mr. Jones promised to send a copy of the program to any requesting such copy by mail.

Delay Blasting

"Recent Practical Developments in the Field of Delay Blasting" was the subject of a talk by Dr. L. Don Leet, associate professor of seismology, Harvard University. Dr. Leet discussed new data on the significance of the vibration dip, as measured by the seismograph, which determines the point of minimum vibration and maximum breakage for a quarry blast. A study of such records has revealed conclusively that reduction in the amount of explosives in a blast is not reflected proportionately in reduced vibration.

It has been proved that the seismograph which, a few years ago, was used mainly as a means of defense



"Barney" car is used to negotiate stiff incline with loaded trucks from quarry to plant

against lawsuits, has great potential as a production tool, he said, for obtaining optimum results from blasting in terms of breakage per unit of powder.

However, he pointed out that the vibration dip (see ROCK PRODUCTS, January, 1952, p. 148, Economic Contributions of the Seismograph) is different in magnitude and location, as determined by seismograph, for each quarry. He showed typical seismograms and pointed out how the vibration dip for a given blast determines best blasting procedure. As an example, the amplitude of vibration for a 12-hole shot was shown to be much less than for a 3-hole shot in the same quarry.

He then discussed the relation of energy ratio to powder factor as determined by vibrations; which also varies with the characteristics of different rocks.

In commenting on the New Jersey regulation covering blasting operations which was enacted in 1952, he said that the most significant thing was the section which states that there must neither be structural damage nor nuisance to persons as a result of blasting. Definite limitations on vibration amplitude and noise levels have been set up in these regulations. This regulation is the result of a detailed study by experts and Dr. Leet believes it may be favorable to the industry. The state, by its very specific regulations, is in a position to defend a quarry operator against complaints.

The many questions following Dr. Leet's talk, and his answers, emphasized the fact that there can be no standardization of practices between different quarries and also brought out that there is much to be learned about millisecond delay blasting.

Questions brought out that sound from a blast will travel farther than ground vibration and that an underloaded shot is inefficient as is an overloaded shot. As to the vibration dip, there are a series of such dips, rather than one, which occur at regular intervals as the amount of explosives in a shot is increased. The relation of spacing to burden is considered very important as affecting the vibration from a blast. Drilling below the quarry floor increases the vibration. As far as the seismograph is concerned, it can be very economical and practical in establishing the optimum blasting pattern for a given quarry. When questioned why only some of the blasts made under the same conditions sometimes bring complaints, Dr. Leet said that the reason is purely psychological and is a personality factor.

Drilling

James H. Grove, M. J. Grove Lime Co., Frederick, Va., reported his favorable experiences with the Quarrymaster drill as compared to other types of primary drills. His figures were those from drilling in a limestone quarry which has a few layers of limestone of 1 percent silica but which consists mainly of a deposit full of rounded grains of glossy quartz which runs up to 25 percent silica. The average silica content of the stone is 18 percent.

Before the Quarrymaster was placed in service, six churn drills were used to drill 6-in. diameter holes at the rate of 1¼ ft. per hour. The use of these drills and the bit sharpening department were discontinued at the end of 1948 after favorable experience with the new drill had been proved.

The Quarrymaster is preferred for its ability to drill rock with wide ranges in hardness. It has been observed to drill in limestone with less than 4 percent silica at rates as high as 35 ft. per hour and, in the author's quarry, has averaged 7 ft. per hour on a yearly basis. But cost has been low and the average life has been 1860 ft. per bit over the last year using Carset bits. Carset bits are redressed with a portable air grinder after each 30 to 35 ft. of drilling.

Because the drill is a self-contained unit it is quickly moved and set up, it requires no water and there are no winter freeze ups. Furthermore, the speaker said that a clean hole is drilled, and cuttings are continuously removed by air and automatically collected.

Mr. Grove has also had some slight experience with a rotary-type drill in this quarry. One disadvantage has been inability to get this drill as close to the quarry face as is sometimes necessary. Also, in this particular rock the holes are not as straight when using the rotary drill.

The 6-in. rotary bit has had an average life of 244 ft. over a 22-day drilling period as compared to 1860 ft. with the Carset bit as observed over a 4-yr. period. Hole production, on the other hand, is 7 ft. per hr. with the Quarrymaster as compared to 12 ft. with the rotary drill. In conclusion, Mr. Grove said that he believes there is a place for either of these two types of drills.

Favorable performance with rotary drilling was discussed by J. M. Christopher, East St. Louis Stone Co., East St. Louis, Ill. The quarry in this case is of fairly hard limestone. It was formerly drilled with three churn drills on a double shift, required to sink from 140-160 ft. of hole per day. Drilling speed was 2½ ft. per hr. and the drills were often required to operate 24 hr. a day for six days a week. Due to intense competition for men in the area, it was almost impossible to keep drillers. Nine were required.

A Joy heavyweight rotary drill was purchased in July, 1952. It has proved to be very maneuverable and can be centered over a hole in one-third the time. Footage is 20 ft. per hr. including maintenance as well as operating time and has been as high as 40 ft. on tests. Bit life averages 1100 ft., this being a low-silica content limestone. There have been no lost holes due to shattering below the floor grade, which was a difficult problem when using churn drills. One churn drill is still in use for drilling in tight spots.

Manpower for drilling has been reduced by some 75 percent due to the increased footage obtained and the time required of the blacksmith and helper has been reduced by two-thirds. The drill holes are 6¼ in. to a depth of 50 ft. No trouble is experienced in drilling wet holes, once the penetration has started.

General Plant Operations

As part of the concluding operating session, movies and slides were shown of eight different plants, which brought out, visibly, many interesting and some unique details of operations.

The crushed granite plant of Consolidated Quarries Corp., Decatur, Ga., was covered by Nelson Severinghaus as narrator. One of the most interesting features of this quarry operation is the use of fusion jet piercing for drilling primary blast holes. Drilling, formerly at the rate of 1¾ ft. per hr., is now at the rate of 30 ft. per hr. The plant has a 5-x 4-ft. primary jaw crusher, and sized materials are stockpiled in seven sizes, minus 2½ in., over a tunnel belt conveyor.

E. J. Reichart, Harry T. Campbell Sons' Corp., Towson, Md., was narrator for a film showing the company's Texas, Md., plant where dolomitic as well as high calcium limestone products are produced. An interesting point was hauling quarry-run stone up an 11 percent grade, with trucks hauling 12 to 14 tons per load. The entire operation was shown, including the very modern new office at Towson facilities of the company, reflecting the rapid growth of this highly diversified company.

Ted Cooke, Lynn Sand and Stone Co., Swampscott, Mass., discussed the entire operation at his plant by film

(Continued on page 93)

Completely Air-Operated BLOCK HOLE DRILL

Drifter type drill for secondary drilling is air-driven and propelled. Operator seated in movable cage under boom controls movement of machine and operation of drill

By W. E. JOHNSON

Showing first portable drilling machine in action at granite quarry

THE WRITER has had many years experience building and designing stone crushing plants, and is familiar with some of the problems of stone producers. One of the meanest of these problems, and the effort and money spent on it netting the least, if any profit, is the breaking of pieces of stone that are too large to go into the primary crusher after primary blasting has been done.

Some operators resort to drop balls, with varying degrees of success and sometimes questionable economy, others install central air compressing plants, run large trunk air lines around or into the pits, branch off these trunk lines with smaller pipe lines, and finally reach jackhammers with hoses. The drop ball method requires a crane, which is subjected to severe strains when the ball glances off boulders and takes up the slack in the hoisting line with a jerk calculated to shorten the life of any machine. Another disadvantage of the drop ball method is that boulders laid around by a shovel have to be placed carefully with a flat side up in order to be broken at all. A drop ball is practically helpless on the slope or up in a muck pile.

In jackhammer drilling much time is wasted in running out the hose, and/or pipe lines, and taking them up twice daily, so that blasting may be done at noon and after the day shift has gone off duty. Much more time is wasted carrying the jackhammers and dragging hose over boulders. An operator of large stone quarries recently told the writer that he figured his jackhammer drillers kept their drills running only 25 percent of the time.

Another objectionable feature of jackhammer drilling is the high percentage of accidents incurred in this phase of quarrying. Accidents from falling and slipping while carrying the drill, and from stone moving in the muck pile, also the danger of silicosis where it is impossible for the drill operators to get away from the dust.

The idea of getting a man on a boom over a muck pile to drill rock was suggested by G. S. Rodgers, superintendent of the Neverson plant of Bryan Rock and Sand Co. of Raleigh, N.C. The writer took the idea from there, designed the machine and applied for a patent.

The next step was to find someone with the necessary money to finance building a pilot model, and confidence enough to risk the money. Messrs. C. H. Wolfe and H. D. Hedrick, president and vice-president, respectively, and principal stockholders of Greystone Granite Quarries, Inc., were the ideal men. In effect they said, "Here is the money, here is the shop and here is skilled help." At this point the writer wishes to state that their cooperation was more than could have been expected, there was not one word of criticism about anything that was done, and hardly one suggestion as to what should be done when some of the original ideas did not work as had been anticipated.

Of course we had some bugs to get out, but they were not as numerous or expensive as might have been expected from such a radical idea, and were soon eliminated. Construction on the rig started on May 21, 1951. An all-around mechanic, Wade Guin, and the writer did 90 percent of the work. On December 15 the machine was officially finished, and we had waited about a month for air hoists.

At first our drilling rate was a little disappointing. Speed came with practice, and before too long we were averaging 50 ft. per hour in boulders. A colored jackhammer operator, Cleo Allen, was standing by the machine watching it run and said, "Mr. Johnson, please let me drill one boulder." As he was the only man who had nerve enough to try something so different from the old way of carrying a jackhammer over a pile of boulders he became the regular operator. As he had never operated any machine except an automobile it took quite a while to get the feel, and become smooth in the movements, getting the drill from one hole to the next with the least lost motion and time. With 1⅝-in. bits he has drilled as much as 60 ft. per hour, and can drill more than 70 ft. per hour of 1⅜-in. hole. The figures are boulder drilling and represent 40, or more, 1⅝-in. holes—the highest number of holes being 50 per hour. That is the highest number we have checked, and that is normal drilling where the pieces are not badly scattered. Of course if the machine has to be moved over 200 to 300 ft., the speed comes down. The average for 1⅝-in. holes is 30 to 35 boulders per hour at Greystone.

At Greystone the deposit is a close-grained granite, the Los Angeles rattler test being 37-38, so it is apparent that we did not pick a soft spot to run any tests.

Basically the pilot model has proven to be sound; our lost time for anything we did at the Greystone shop being less than two hours—except of course for making minor changes or getting the bugs out. The machine has been in continuous operation since December 15, 1951.

Less Drill Wear—Easy to Operate

Before construction was begun, the writer was told by drilling experts that the machine would be easier on steel and bits than a jackhammer. Not only has this proven true but the machine does not wear a drill anything like a jackhammer is worn by hand drilling. These things can be attributed to the drill steel being held in a straight line, and the proper pressure being maintained on the bit. Also, by not having to use short pieces of steel in starting the hole a large part of the time the drill chuck is farther away from dust coming out of the hole. The 3-in. drifter installed when the machine was built, and running daily since then, has not had a single replacement in the drill proper but has required a new feed screw and nut. Also, the drifter now drills as fast as when new.

The amount of footage drilled is not the whole story by any means; much footage is saved by being able to drill a hole at any angle to reach the center of a boulder in the shortest distance. Collaring the bit is the least of all the troubles, and the one most feared when the idea was being worked out. A hole can be started on a flat surface or nearly flat one almost instantly after contact, and on a 45 deg. slope in a few seconds.

How Drill Operates

The machine is essentially a cage suspended from and movable back and forth under a boom, a trolley from which the cage and drill is suspended, and a chassis supporting a gantry frame and boom.

All controls are operated from a chair in the cage, such as moving the machine in a straight line back and forth, turning to right or left, swinging around as a conventional crane, moving the trolley along the boom, raising and lowering the boom, swinging the drill in any position from 53 deg. to right or left, to parallel with the boom ahead and back between the opeator's feet.

Three rubber-tired wheels support the chassis, two 12:00 x 24 tires are mounted near the front and one caster, or dolly, fitted with a 10.00 x 15, 14-ply tire is located 8 ft. back. The caster wheel is offset 15 in. from its top bearing and easily follows the turning movements of the front, or driving wheels.

Each of the driving wheels is driven independently to accomplish turning or steering—one may rotate ahead and the other backward at the same time in making a spot turn, or one may run in a small circle and the other in a larger one in making a longer turn. Propulsion is by two Gardner Denver MEB air motors, each driving through a roller chain to a two-speed gear box, from the gear box by sprockets and chain to a jack shaft, and by sprockets and chain to the wheels. The driving wheels are fitted to a heavy truck trailer axle with air brakes built in, the brakes releasing when air is applied to the motor, and setting when the motor is stopped. Gear shifting is done from the chair by a three-way valve and ¼-in. hose. A hand brake is fitted for parking the machine when not in service. All bearings in the driving wheels, dolly wheel and jack shafts are Timken roller type.

For moving the trolley a Gardner Denver HEK hoist is used, fitted with a sprocket on the drum. A roller chain is fastened to the back end of the cage, passed around the sprocket on the hoist and the other end fastened to a counterweight inside the boom. The counterweight is fitted with four rubber tired wheels running in a track. From the outer end of the counterweight a cable runs around a sheave at the boom point and fastens to the front of the cage.

The purpose of the moving counterweight is to keep excessive weight off the caster wheel. When the cage is in, the weight is out. For instance, with the boom at its lowest position, moving the cage from the extreme in position to farthest out shifts the balance of the machine only eight inches, and the balance is only shifted 34 in. from boom down cage out to boom up 45 deg. and cage in.

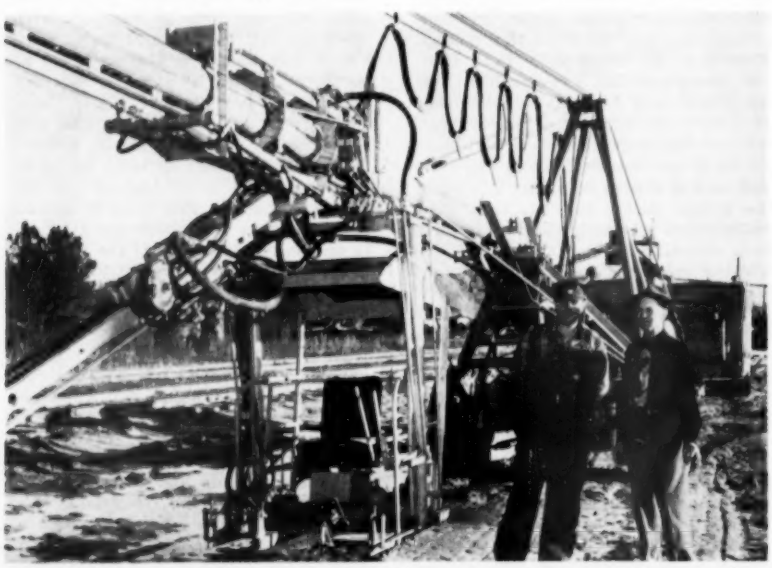
The boom is raised and lowered by a Gardner Denver HKK hoist, the boom hoist cable being $\frac{7}{16}$-in., 6 x 37 Hercules red strand, six parts running to the boom point and two parts to the hump. As each part of line has a strain of 1,600 lb., the load is very light. Less cable could have been used here, but the boom was rigged this way as a much larger safety factor. Both boom and trolley travel hoists are fitted with automatic brakes. In operation the boom and trolley travel hoists have to be run down the same as up; there is no easing off the brakes and letting them coast down.

The drill is swung into the position desired by three hydraulic cylinders, two for the fore and aft motion, which is straight out under the boom to back over the chair arms or between the driller's feet, and one cylinder for a side movement of 53 deg. each side of plumb. All cylinders are controlled by one lever beside the seat.

The hydraulic system is composed of a Gardner Denver JCM vane motor and pump, a 1-gal. accumulator, a 366-cu. in. sump tank, two ⅝-in. piston four-way valves cast en bloc, aeroquip hose and fittings and three 2 x 20-in. 1,500-lb. W.P. cylinders. The pump, sump tank and accumulator are mounted on the floor behind the seat.

In designing, building and watching the pilot model run, the writer learned many things and saw many ways to improve future machines. These things were noted and incorporated in drawings for the finished product. Arrangements were made for the Corbitt Co. of Henderson, N.C. to build a second model with the view of quantity production. P. J. T. Rawlins and W. K. Phillips are chief and assistant chief engineers, respectively, and their contributions to redesigning have made it a much better looking, and better machine, than it would have been without their help. Their idea was not only to build a nice looking job, but also to use as many standard parts as possible.

In building the production pilot model only top quality material was used, the hydraulic system is com-



Close-up of portable secondary drilling machine showing conveniently arranged air controls at operator's seat which is suspended from movable boom. Standing to the right are Wade Guin, left, and W. E. Johnson. This is the second machine built

View of completely air-operated, secondary drilling machine with W. E. Johnson at the controls

parable to that used on airplane landing gear, in pump, accumulator, four-way valves, sump tank hose and fittings. Many porous bronze lubricant retaining bearings (Compo) are used throughout. These bearings, with one exception, are not drilled for oil, but oil cups and sometimes reservoirs are fitted, so that oil will soak through the sleeves and provide constant lubrication without daily attention. Many of the oil cups will not need attention as often as once a month. Daily service on the rig consists of filling up two line oilers, and squirting a few drops of oil in four cups.

Air is provided by a 210-cu. ft. Gardner Denver compressor, driven by a 75-hp. Caterpillar diesel motor. A choice of two drills is given, a 2¾-in. or 3-in. drifter. The pilot model in use is provided with a Joy 3-in. drifter. Both models have 4-ft. feed.

The 4-ft. feed is ample for boulder drilling, and fast for holes up to 9 ft. deep. When the drill penetrates 4 ft. the steel is pulled back or up, the boom lowered or the trolley moved, or both, until the hole starter is close to the rock and the rest of the steel run in. It takes a very few seconds to line up the steel for the second or third run.

When drilling, the operator is almost never bothered by dust, the only exception being when drilling straight down between his feet when there is no breeze blowing—even then he is 6 ft. or more from the drill hole. Some times when drilling off to one side, or ahead, he is as much as 10 ft. away from the boulder being drilled.

The writer, in designing this machine, was hoping to build a drill rig that would be safe to operate and would replace enough jackhammer drillers to be economically sound for production, and wishes to state that it has come up to and exceeded expectations.

The Travel Drill Co., Raleigh, N.C., will build and market the machines. Six are now under construction. O. M. Davis is president of the company.

Crushed Stone Meeting

(Continued from page 90)

and slides. He is using a Quarrymaster drill on one of the toughest rocks being quarried in the United States, which is identified as gabbro-diorite. The drill's performance is 7½ ft. per hr. as compared to 1 ft. using the old well drills. A feature was the use of a 2-piece, 6500-lb. drop ball swing from a 1½-cu. yd. Caterpillar-mounted crane with 60-ft. boom. Also shown was the new fine reduction plant for producing minus ⅜-in. products. The plant was one of the first in the industry to install a dust-collecting system. In connection with it are company-owned asphalt plants and a ready-mixed concrete plant. Mr. Cooke recommended that crushed stone producers seriously consider ready-mixed concrete as an added product.

L. F. Miller, New York Trap Rock Corp., Newburgh, N.Y., showed pictures to emphasize specific operations that he thought might be unique to the industry. He first showed the large Clinton Point plant and quarry. The screen house consists of eight concrete silos on top of which are the sizing screens. The silos are 80 ft. high, 50-ft. diameter, and hold a total of 143,000 cu. yd. of stone. The primary crusher is a No. 21 Allis-Chalmers gyratory and there are three 7-ft. Symons cone crushers. The quarry ranges from a face of 70 ft. to 160 ft. The use of grappling hooks to dislodge stone or remove them when hangups occur was shown. The Haverstraw quarry was also shown. This is the quarry where it is necessary to haul the stone up a sharp incline from a lower level and where barney cars are used to negotiate the climb.

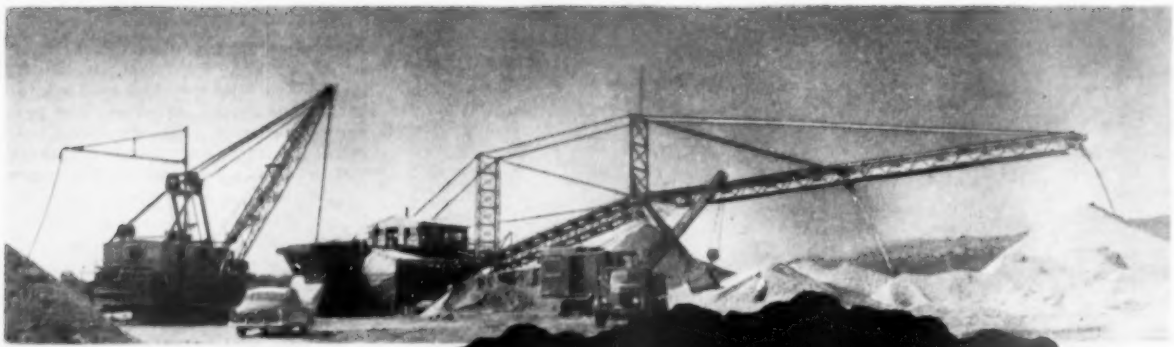
Heavy rails in truck bodies resist shock of falling stone

Some of the safety measures were shown in connection with primary blasting and actual blasts were shown to illustrate what takes place with delayed action blasting.

Photographs were shown of one of the electric motor storage places where some 100 spare motors are stored, so that quick replacements can be made. The listing of motors was also shown, as was the use of thermit welding of the boxes and rope sockets on well drill stems.

Other excellent films and slides showed operations of Camp Concrete Rock Co., Ocala, Fla., which was a professional film, Consumers Co., Chicago, Ill., Cowan Stone Co., Cowan, Tenn., and Georgia Marble Co.

W. E. Johnson, Greystone Granite Quarries, Inc., who demonstrated new drill for block-hole drilling which he invented



General view of plant showing walking dragline, dredge, and stacker belt conveyor

DREDGING
For Gravel and Gold

By WALTER B. LENHART

Floating sand and gravel plant of Cooley Gravel Co., in Clear Creek Valley near Denver, Colo., recovers gold as by-product. Reclaims fines with "liquid" cyclones

THE COOLEY BROTHERS, C. G. and L. M., have had about as diversified a life of material handling as any sand and gravel operator could hope to have. A lifetime of experiences is climaxed by their latest operation in Clear Creek Valley, about 4½ miles north of the heart of Denver, Colo. The scope of their activities during the past two or more decades is such that the sand and gravel industry, the coal industry, the lead-zinc and even gold mining industry owe these brothers a debt of gratitude for the pioneering work they have done. C. G. Cooley, the spark plug of this team, had three temporary sand and gravel plants in Indiana in the mid 20's. About that same time he established a permanent plant at Gosport, Ind. In 1929 he purchased the Chillicothe, Mo., operation and a few years later the brothers opened an Alexandria, La., operation. The Chillicothe plant of the Cooley Gravel Co. is still producing, and it is here that our story really starts.

The author visited the Chillicothe operation in the late 20's. At that time it was (and still is) a tough operation because of a sticky clay throughout both the sand and the gravel.

Left to right: L. M. Cooley and C. G. Cooley, brothers and owners of Cooley Gravel Co.

Having observed the use of conical scrubbers in the Florida phosphate fields, Mr. Cooley installed a Hardinge conical ball mill to scrub his material. It was the first Hardinge mill ever to be used in any sand and gravel operation in the United States. He first operated it with steel balls but soon found that the coarse gravel served the same purpose. He also operated it without any screening equipment attached to the mill—that was added later when it was found that such a ball mill could efficiently do double duty as a screen. It is still doing an excellent job.

Also he had at that time a considerable stream of fresh water going into the Symons cone crusher used as a secondary crusher, presumably to help push the sticky material through the cone. In our 25 years of travel since, Chillicothe is the only place we have seen that done.

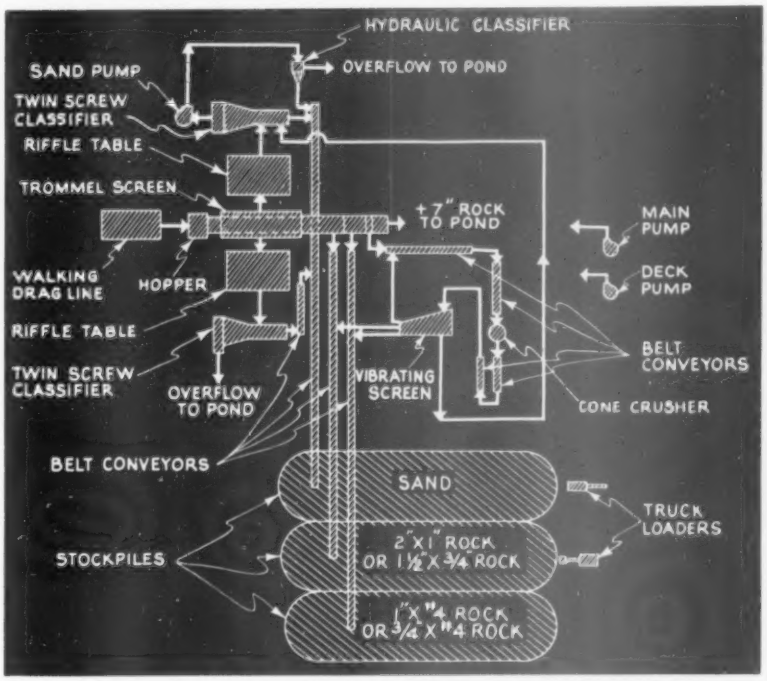
A stream of water is still used at the Chillicothe operation because of the clay balls in the oversize gravel. Without the water the cone soon plugs up. At first considerable trouble was encountered due to water getting into the lubricating oil, but this was corrected by installing a 6-in. wide rubber skirt around the bottom of the head or cone.

The real story of the Cooley brothers does not start until post-depression days. During the spring of 1932 this editor again visited the Chillicothe operation, and through some fortuitous chain of circumstances the subject of gold occurring in sand and gravel deposits came up for discussion. The upshot of it was that on that particular day, gold was discovered in Missouri and in Mr. Cooley's deposit—not in commercial amounts but what was possibly a concentration product derived from the previous treatment of hundreds of thousands of tons of material. However, it was gold—nice to look at and nicer to contemplate. But C. G. Cooley was not one to stop there, for when the depression deepened in the Chillicothe area he found that he had a lot of equipment that could be used in the gold camps of Colorado and Montana. So almost overnight he and his brother became gold miners. Most stories of men inexperienced in gold mining usually end here with a sad note, but not the Cooley brothers. It took the United States government and its Gold Order No. L-208 to stop them as gold producers, for by this time they had successful gold dredging operations at Como, Colo., and at Townsend, Mont. Their first gold dredge was at Pine Cliff, Colo.

As many ROCK PRODUCTS readers are not familiar with gold mining terminology, we wish to point out that there are two classes of gold mining: lode mining is the type where the values are in rock formations, and the rock must be blasted, crushed and pulverized before the values are extracted. The second type is placer mining. Here nature has freed the gold and it remains in sand and gravel deposits. Its recovery is a sand and gravel handling problem; digging,

washing, scrubbing, screening and more washing, and disposal of the debris after the gold has been extracted. One can learn much from these types of operation for deposits that contain in excess of 15 to 20 cents per cu. yd. are usually quite profitable. The Denver operation is unique in that it combines production of commercial aggregates with gold dredging. Here is a quick picture of the Denver operation. Two men on the dredge and two on the dragline process as much as 275 t.p.h. From it they recover 4 cents per ton in gold, or enough to pay the electric power bill. The dredge produces and stockpiles two sizes of aggregates, some of which are crushed, and one grade of concrete sand. As dredging proceeds these are stockpiled from a long stacker in three parallel rows. From these windrows reclaiming equipment loads it to trucks. Even by using the latest in truck-loading equipment it costs the Cooley brothers almost one-half as much to load into trucks as it does to get the material into the stockpile. So cost-cutting-thinking is along the lines of better and cheaper truck loading methods.

When the gold order of October, 1942, closed down the dredges, the versatility of the Cooley brothers' operation again reasserted itself. They piled up another "first." This time they moved into the lead-zinc mining districts, and while the skeptics looked on, they opened up the first strip mining operations in the area. The ground they chose to strip was locally known as "Sucker Flats" because of the dingy reputation of its past performances. However, they moved in two 3-W Bucyrus-Erie walking Monighan electric draglines and proceeded to strip up tc 145 ft. from the ore deposits. They established a bench system of stripping, one dragline casting the stripping back and up on to the next higher bench and the dragline above. Because of local conditions it was not practical to build a ramp out of the pit. Five Bucyrus-Erie Red Arch buckets were available for use, which ranged from 2½ to 3½ cu. yd. The material handled was very abrasive and it took about a ton per year of $\frac{3}{16}$-in. Lincoln Abrasoweld hard surfacing rods to keep the buckets in good condition. When this project was completed, the brothers turned back to gold dredging at Como, Colo., where earlier they had been stopped by Gold Order L-208. But the high and still climbing costs of labor and supplies in combination with controlled price for gold again stopped that operation. Thus the brothers wound up with two gold dredges on their hands. Parts of one dredge such as the trommel screen, pumps and stacker were used in a plant now located near Boulder, Colo. and which at the moment is inactive. However, it played its part in supplying aggregates for the Denver-Boulder Turnpike and the Rocky Flats atomic project, but while it was in operation, it too established still another "first." It was the first sand and gravel operation in the United States to use a DorrClone for recovery of added finer sizes. We will refer to this development later.



Flowsheet of sand and gravel and gold recovery equipment on floating plant

During the early 1950's the Cooley brothers took another adventure. This time it was coal stripping and processing operation in western Colorado a few miles west of the Continental Divide. Here again they showed their courage and resourcefulness, for the mine is the highest strip operation in the United States, some 8000 ft. above sea level in a location where up to 150 in. of snow fall during the winter. At the coal tipple, a 42-in. conveyor belt exactly ½-mile long is used to bring the coal down the mountain to the railroad. The belt drive motors, after the belt is started, generate electric energy sufficient to run the entire coal tipple. Electric generation also provides braking action to prevent belt from running too fast.

Meanwhile the gravel business in Chillicothe kept going; the plant is now substantially as it was in the early 30's, but the Cooley brothers always dreamed of the day they could bring the plant to the gravel, instead of the gravel to the plant. With two dredges resting high and dry, their inventiveness again went into play.

They first purchased 10 acres of gravel-bearing ground in Clear Creek Valley and leased on a royalty basis an additional 120 acres. The next hurdle was the Adams County Planning Commission which would not allow a new operation of this kind. Agreement was reached when the company offered a plan to dredge the area to form seven distinct and separate ponds or lakes. These ponds were to be roughly rectangular in shape and to be separated by parallel causeways. The causeways between ponds will be dirt fill, consisting of the overburden stripped from the gravel. Their plans call for landscaping these separation strips and building modern cottages or auto courts on them. The lakes will be stocked with trout.

But changing a gold dredge into

Dragline bucket unloading to floating plant

Loading out materials from stockpile to truck

an efficient aggregate producer is still another successful "first." The dredge originally was a Bodinson Mfg. Co. unit, referred to in the trade as a "Doodle Bug" dredge. (The dredge has been named "Gravel Gertie" by its owners.) The processing equipment on such a dredge floats on pontoons with a dragline working from the shore digging and dumping the gravel into the hopper on the dredge. At the opposite end of the receiving hopper is usually a long stacker belt conveyor so that debris is dumped back into the pond once it has been through the gold processing equipment aboard the dredge. In such a design, portability is complete, and usually four or more steel cable shore lines and a "spud" operated from suitable winches spot and anchor the dredge at new locations as digging proceeds.

Obviously, having a stacker belt at the rear or far end of the dredge would not deliver finished gravel to a receding shoreline, so at the beginning of the dredge's reconstruction a hole was excavated in the deposit and the steel pontons making up the hull placed therein. A new steel stacker boom 150 ft. long (the previous one was only 60 ft. long) was mounted at right angle to the long axis of the dredge. To counterbalance this added side weight, the 4-ft. Symons cone crusher was installed on the opposite side of the dredge along with 22½ tons of scrap steel and iron ballast. The three conveyor belts are mounted on the 150-ft. stacker boom. To reduce the weight of the overhanging stacker boom, the belts were restricted to 18 in. widths, and these even ride carrier rolls designed for 16-in. belts. For the same reason, all the conveyor belts drive from the tail pulley assemblies and much ingenuity had to be exercised to get the belts over and under steel members in the structural framework of the dredge. In addition, two belt conveyors had to be installed to take the rock from the scrubber to the Symons cone, as well as two belts to convey the material from one of two sand recovery screws to the stacker and two belt conveyors that transfer the crushed gravel from the cone crusher to the Pioneer 3-deck vibrating screen. With the additions and rearrangment of equipment on the dredge, the subject of its stability became important. However, when floated, it kept an even keel and is operating successfully. It is now one of the largest producers in the Denver area.

Fine Sand Recovery

During the first few days of the dredge's operation it became apparent that the sand produced was deficient in fines—a failing that appears to be quite common in the Denver area. A "liquid cyclone" type of separator was installed to recover the fines. A Whirlcone, manufactured by Cottrell Engineering Co., Los Angeles, (also made by Georgia Iron Wks, Atlanta, Ga. for eastern markets), was chosen. Its operation has been very satisfactory. It is a 25-in. diam. unit and resembles in outward appearances a conventional dust collector. Thin pulps containing slimes and fine sands are pumped tangentially into the unit. Centrifugal motion of the mass inside the cone forces the sand to the periphery of the cone; the particles work downwards and are ejected as a stiff ropy pulp. The slimes go out the top of the cone. The device occupies very little space, and has a large capacity.

At this operation the sand from the sand jacket on the rotary scrubber-trommel is split into two equal fractions. Each fraction flows over 250 sq. ft. of "Hungarian riffles" where the gold deposits. One bank of riffles is mounted on each side of the dredge. After the gold is removed the sands from each bank of riffles flow to individual 20-in. x 15-ft. Telsmith twin dewatering screws. Material from these falls to the offbearing stacker belt. The fine sand from the Whirlcone is blended directly with the sand from the screws. Thus it will be seen that there are two sets of dewatering screws, one on each side of the boat. The set of screws that is on the starboard side (same side as the cone crusher) is distinctive because about half of the overflow from the screw's weir is picked up by a 4-in. Kansas City Hay Press sand pump and the pulp delivered to the liquid cyclone separator. The pump uses a 20-hp. G.E. motor. A larger pump may be installed later to deliver all of the screw's overflow to the separatory cone. The present pump is a left-over unit from the previous operations, but it is delivering 700 to 750 g.p.m. of pulp. The cone operates at 16 p.s.i. pressure. The lower half of the cone is rubber lined and lasts about four months. The liquid cyclone recovers 1 to 2 t.p.h. of sand of the following screen analysis and deposits it on the same offbearing belt serving the dewatering screw.

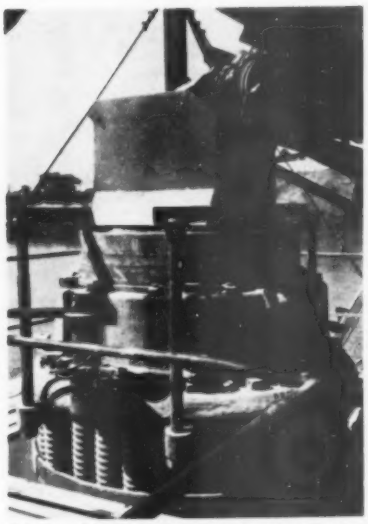
Minus 20 mesh	99.9 percent
Minus 50 mesh	92.0 percent
Minus 100 mesh	60.0 percent
Minus 200 mesh	3.5 percent (approx.)

The separatory cone discharge is roughly 73 percent solids. No valve is used on the sand outlet or cone end, but the size of the opening is a function of the rate (and water content) of the cone's discharge. The percent solids in the overflow from the weir of the sand screw is quite low—possibly between 2-5 percent.

The plant that was used at Boulder, Colo., now inactive, produced over 300,000 tons of washed sand and gravel. The bulk of this material went into the Boulder-Denver Turnpike and therefore the material complied with the specifications of the Colorado State Highway Department. This called for a plus 1-in. minus 2-in. rock, a plus No. 4, and a minus 1-in. rock. The following tabulation shows the specifications and typical examples of how they were met.

Amounts passing this screen in percent

	2" x 1" Stone		1" x #4 Stone		1½ x ¾ Stone		¾ x #4 Stone		1½ x #4 Stone		Sand	
	SPECS.	TYP.	SPECS.	TYP.	SPECS.	TYP.	SPECS.	TYP.	SPECS.	TYP.	SPECS.	TYP.
2½ in.	100	100										
2 in.	95-100	96.8			100	100			100	100		
1½ in.	35-70	59.0	100	100	90-100	96.5			95-100	98.5		
1 in.	0-15	5.5	95-100	97.7	20-55	51.2	100	100				
¾ in.					0-15	11.8	90-100	93.5	35-70	43.2		
½ in.	0-5	.2	25-60	37.2								
⅜ in.							20-55	31.0	10-30	13.7	100	100
No. 4			0-10	4.2			0-10	7.1	0-5	3.0	95-100	99.4
No. 16											45-80	75.0
No. 50											10-30	16.7
No. 100											2-10	3.7



Cone crusher mounted on dredge. It has been located to help counter-balance weight of the 150-ft. stacker conveyor

Stacker boom carries three belt conveyors with special drives designed for minimum weight

The F.M. of the sand runs from 2.60 to 2.75. The sand produced amounts to from 70-110 t.p.h., or roughly 45 percent of the total production.

At the Boulder plant a DorrClone was used for recovery of minus 50- and minus 100-mesh material. The unit was intended for use on the Denver dredge but when a shortage of fines developed at Boulder it was installed there. The DorrClone will be installed on the Denver dredge sometime this year; it will be mounted on the side opposite the present sand recovery units. This addition will increase the tonnage of sand recovered. This second recovery unit will receive the overflow from the second bank of sand screws.

It is interesting to note that on the Boulder installation a valve was provided on the discharge line of the liquid cyclone for the purpose of installing a pressure gauge. It was noted that when this valve was open, air was admitted into the line because the discharge line ran down several feet after leaving the DorrClone. When this valve was opened the discharge became more liquid and indications were that under these circumstances the unit caught more very fine sand.

The DorrClone works on the same principle as the other separatory unit. It is of cast construction and has certain refinements. As used on the Cooley Gravel Co.'s dredge at Boulder, it delivered a fine sand from classifier overflow and produced a product that had the following screen analysis:

Minus 16 mesh	100.0 percent
Minus 30 mesh	99.7 percent
Minus 40 mesh	99.0 percent
Minus 50 mesh	96.4 percent
Minus 100 mesh	64.4 percent
Minus 200 mesh	7.2 percent

The rotary washer-screen is the first operating unit on the dredge. A 14- x 14-ft. sloping steel hopper resting on wood cushions receives the gravel from the dragline and jets of clear water wash the material into the trommel. No feeder is required here. Abrasion-resisting steel bars are placed at points of heavy wear in this hopper and in the 48-in. throat to the trommel. The bars are ¾ x 4 in.

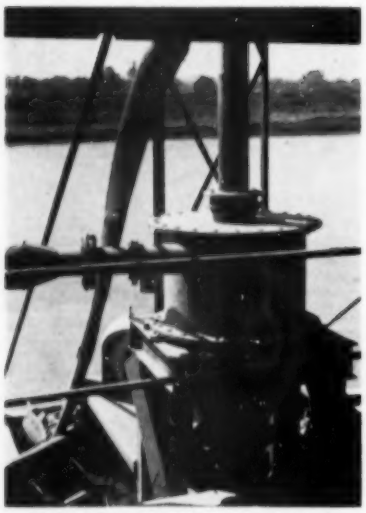
Gravel Production

The rotary screen is a type seldom seen in the rock products industries, so a detailed description may be of value. The screen is 5 ft. in diameter and 42 ft. long. It has an outer sand jacket at the upper or feed end that is 6 ft., 10 in. dia. x 20 ft. long. The jacket uses taper drilled holes throughout its length; these are as follows: ¼ in. for first 15 ft.; $\frac{5}{16}$ in. for next 2½ ft.; ⅜ in. for next 2½ ft. Material passing these openings along with the heavy flow of water splits and goes to the gold recovery riffles which in turn go to the sand screws.

The trommel has six sections of 5-ft. screen, and a 6-ft. scrubber section at the head end and a 6-ft. blank section at the bottom end. The scrubber has a spiral with about 21-in. pitch which acts as a feeder. There are baffles about 11-in. high at the end of the first four screen sections.

Starting at the feed end, the first screen section is ⅜-in. manganese steel plate with cast ½-in. tapered holes spaced on 2½ in. centers. The second section is also manganese steel plate (same thickness) with cast ⅝-in. holes on 1⅝ in. centers. The third section of manganese steel has ⅝-in. cast holes on 1⅜ in. centers. The

One of the two banks of gold recovery sluices



Hydraulic classifier for recovery of fines

fourth section is armor plate with $1\frac{1}{16}$-in. holes space on $1\frac{1}{2}$ in. centers. The fifth section is $\frac{3}{8}$-in. wire cloth. The end section, or sixth section, is split into two parts: first, 3 ft. of $\frac{3}{4}$-in. armor plate with $1\frac{3}{4}$-in. holes on $2\frac{1}{2}$ in. centers, and an end section (2 ft. long) of 7-in. x 12-in. slots. Material passing the slotted section goes to the Symons cone crushers on two 24-in. belt conveyors. Any plus 7 in. falls back to the pond. The sizes of gravel produced are No. 4 to $\frac{3}{4}$ in. and $\frac{3}{4}$ to $1\frac{1}{2}$ in. The flow sheet will give the essentials of their preparation. The trommel acts as a scrubber, a screen, and an eliminator of any soft particles. It carries a heavy load of plus $1\frac{3}{4}$-in. gravel, a considerable portion of which is in the 3-in. to $4\frac{1}{2}$ in. dia. range so there is a large mass of rock to aid in the destruction of soft particles and clay segments. Most of the water from a 10- x 16-in. Winsby United Iron Works pump, driven by a 40-hp. G.E. induction motor and delivering 2000 g.p.m. at a 45-ft. head, goes to the trommel and Pioneer vibrating screen. A general utility pump; a 20-RVL-10 Ingersoll-Rand deck pump powered by a 10-hp. G.E. motor is also available.

Excavation Methods

The deposit has about 5 ft. of overburden which can be pushed back with tractor and dozer, but practice has been to use the dragline. For stripping purposes a lightweight $3\frac{1}{2}$-cu. yd. Hendricks perforated bucket is used. The dragline stacks the overburden out of the way but so it can be reclaimed for building up the causeways between the ponds. The gravel is about 18 ft. deep, there is an estimated 5,000,000 tons of material, enough to last for about 15 to 20 years. The pit material appears to be fairly well distributed as to size with very few pieces over 7 in.

Primary excavation is done by a 3-W Bucyrus-Erie walking Monighan with a 90-ft. boom. The loading bucket is a $3\frac{1}{2}$-cu. yd. Type AX Bucyrus-Erie unit. It makes a 65 ft. cut. The same dragline is used during off-seasons for stripping. The unit has Ward-Leonard controls that operate with 2300 volts current purchased locally. The dredge motors all use 440 volts current stepped down by 2300/440-volt transformers mounted on the upper deck of the dredge. Powering the walking Monighan is a 125-hp., 2300-volt Westinghouse induction motor which drives two 250 volt d.c. generators which in turn handle a 75 hp. d.c., digging motor and a 25-hp. swing motor. Power is delivered to the dragline by over 2000 ft. of No. 63 Type G portable cable.

The hull of the dredge raft is made up of ten steel pontoons, each 8 x 40 ft. and 4 ft. deep; over-all size is roughly 65 x 57 ft. Each pontoon weighs 5.12 tons. The total weight of the dredge is calculated to be 306 tons. Each pontoon has three watertight compartments. The spud is a 19 ft. length of heavy-duty, 12-in. steel pipe with a forged toe. It is controlled through a 3-hp. Master gearmotor. The four shore cables are controlled through a 4-drum Bodinson winch powered by a 5-hp. Pacific gearmotor.

At Como, Colo., where the dredge previously operated, it floated on seven pontoons each having the same dimensions. The added equipment called for the addition of three more pontoons, two added one on a side to compensate for the 150-ft. stacker boom and one under the hopper.

All conveyors are driven through 2 to 7.5 hp. U.S. Syncrogear motors with Link-Belt chain drives. The idlers are all Chain Belt with New York and Goodyear conveyor belts used. At the outboard end of the two stacker belts handling the gravel sizes are reciprocating discharge chutes that are designed to decrease segregation in the piles below. The chutes are driven from the head pulley with reciprocating motion imparted to them through the use of water-well jacks. These were company made.

All shipments from the Denver operation of the Cooley Gravel Co. are by truck. For reclaiming material, the bulk of the work is done by a 54-B Pettibone-Mulliken Speedloader that is powered by an 8-cylinder Chrysler industrial engine. The latest acquisition for reclaiming is a 4-wheel drive model 15-D Pettibone-Mulliken Speedall chassis equipped with an Austin overshot loader. It is driven by a 3-cylinder General Motors industrial diesel engine. Trucks are weighed on a 50-ton capacity Fairbanks Morse scale.

The gold in the Cooley operation occurs as small particles which, at times exceedingly fine in size, are heavy and settle readily in the eddies created by the Hungarian riffles. The gold is in no sense flake or leaf gold. It amalgamates readily with mercury.

Each of the two banks of riffles is made up of six launders, each about 30 in. wide and 16 ft. 4 in. long. The launders are all parallel to each other and slope about $1\frac{1}{2}$ in. to the foot. The riffles are $1\frac{1}{4}$-in. steel angle irons with a $\frac{3}{16}$ in. thickness. They are assembled in banks, each bank having several riffles, for convenience in removing them from the sluice boxes for clean-up. Enough water accompanies the sand so that there is sufficient turbulence to keep the sand moving, but also to let the heavier gold settle behind the riffles. As gold has a sp. gr. of 19.7 compared to sand sp. gr. of 2.65, considerable turbulence can occur without too much danger of losing values. Mercury is placed in the riffles and is held there in rubber traps. Gold coming in contact with the mercury forms an amalgam. About once per month the riffles are cleaned out and the amalgam recovered and retorted. Retorting yields a gold sponge that is sold to the U.S. mint and, at the same time, recovers the mercury for reuse. The riffle operation needs practically no attention. One man could run the entire dredge operation, but for reasons of safety two men are kept on the dredge. The gold recovered contains some silver but is around 800 fine, i.e., about 80 percent pure gold metal.

Personnel

E. J. Wemlinger is manager, H. Orville Enderud is the engineer who in cooperation with the engineering staff of the Bodinson Mfg. Co. redesigned the dredge; Ervin Meyer is dispatcher and scale man; Reiny Reiber is dragline operator, Dock Wright is loading foreman, and Harold Baker is the floating plant operator.

Underground Mining Equipment

THE BUREAU OF MINES recently released Report of Investigations No. 4739, on "Some Innovations in Equipment for Scaling High Roofs and Mine Walls," written by Brinton C. Brown, Fred D. Wright and Homer J. Ballinger.

The report describes the methods and equipment developed at the Bureau's experimental oil-shale mine near Rifle, Colo., for placing men in position to scale loose rock from the walls, pillars and roofs of high stopes or rooms. According to the report, the equipment developed at the Rifle mine has application not only in oil-shale mining, but also in most of the country's underground limestone mines and in the exploitation of other mineral deposits mined in high stopes by room-and-pillar methods. These methods were described in ROCK PRODUCTS, March, 1952, p. 80.

Interlocking electrical central control system permits one operator to supervise functioning of all equipment at Riverton Lime and Stone Co., Riverton, Va., plant

By C. R. ATHERTON*

General view of lime plant. Note conveyor above railroad tracks. Primary crushing is done in the building to the left; tube milling and final screening in the building to the right

Improve HYDRAULIC LIME Quality

TO INCREASE PRODUCTION and improve the physical quality of materials used in the manufacture of Flamingo hydraulic lime, the Riverton Lime and Stone Co., Riverton, Va., has recently completed an extensive program. The chief raw material for the process is a calcareous shale of unique analysis.

The initial phase of production consists of four steps:

1. Calcining the shale in mixed feed kilns.
2. Pulverizing the calcined product.
3. Hydration.
4. Grinding.

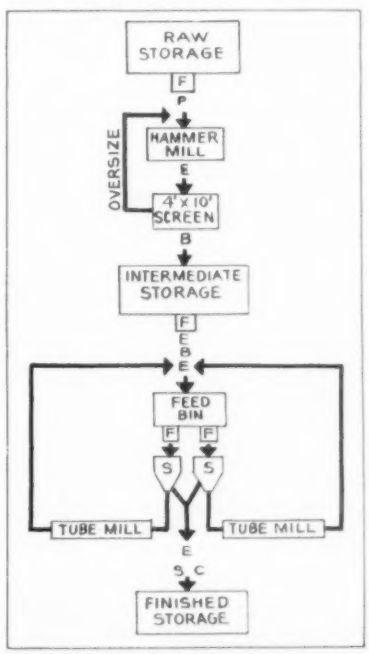
Hydrate resulting from the third step may be considered as processed raw material for the production of hydraulic lime.

The use of the processed raw material, the further phases of its treatment, and the nature of the finishing processes do not comprise a part of raw material processing and therefore are not discussed in this article.

Preliminary Reduction

Some years ago the first steps were taken to improve and simplify the preparation of the kiln product. A Pennsylvania center-feed hammermill, operating in closed circuit with a 4- x 10-ft. Tyler two-deck Hum-mer screen was installed to effect the preliminary reduction. The rate of feed to the hammermill was controlled at the raw storage bins by installing Jeffrey and Syntron vibrating feeders. The feeders deliver the raw lime at a predetermined rate to 30-in. pan conveyors which were modified in connection with the new installation in order to provide for delivery of material at a point aproximately 10 ft. above the point of hammermill feed. A vertical curve was provided in one of the existing pan conveyors and the whole structure was mounted on steel frame supports with timber stringers in order to utilize existing equipment.

A bucket elevator, 71-ft. centers, with ample capacity to accomodate the circulating load was installed to elevate the hammermill product to a short belt conveyor for delivery to the Tyler screen referred to above. Oversize material from the screen returns to the hammermill at the apron conveyor discharge point, and material passing the screen is conveyed to intermediate storage in three steel bins adjacent to the crushing facilities.



Flowsheet of raw material preparation: (F) feeder; (P) pan conveyor; (E) elevator; (B) belt conveyor; (S) separator; (SC) screw conveyor

A 24 in. wide Eriez Giant plate magnet with special replaceable plates is provided in the discharge chute from the apron conveyor to protect the hammermill against tramp iron.

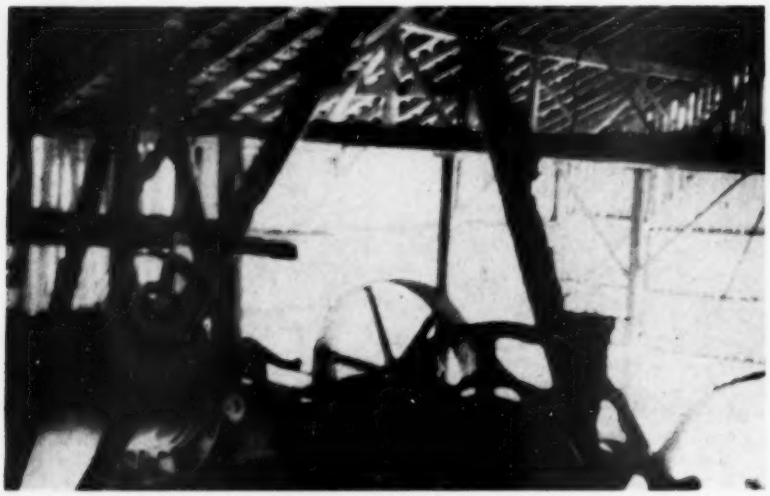
The first phase of the modification as described above was placed in operation in the early part of 1949 and resulted in the elimination of a roll crusher and two mills, which had, up to that time, been used in series to produce the material now obtained through the single closed-circuit reduction operation.

In the course of the following summer the lower deck screen cloth on the Hum-mer screen was replaced by successively finer screen until the finished material was being sized in adequate quantity over a screen having a .074 opening, as compared with the .125 opening provided in the original installation.

After approximately two years of successful operation in the primary reduction operation, management decided to modify the balance of the reduction facilities with the objective of obtaining increased capacity and increased fineness of material.

Operation until that time consisted of withdrawing lime from the storage bins by means of a Fuller feeder, conveying it by air through a pipe line running under the Norfolk and Western main line tracks adjacent to the plant and delivering it to one of two F. L. Smidth ball type tube mills

*Consulting Engineers, Annville, Penn.



Mill feed pipes and finished product discharge lines from separators installed above the two tube mills operated in parallel

for final reduction. The conveying air was supplied by a Roots-Connorsville blower and acted also as the medium for sweeping the ball mills and elevating finished material to storage. The blower was wasteful of power and the underground air conveying line proved troublesome because of the highly abrasive character of the material. Frequent downtime was required for the replacement of worn conveyor line, particularly at the bends in the duct work. Two ball mills similar in size were available but the nature of the air line complicated the problem of feeding the mills and it was almost impossible, by the method then in use, to operate both mills at the same time. Rectification of this condition was one of the objects of the second modification.

Simplify Fine Grinding

Simplification of the second phase of operation was undertaken in the spring of 1951. A screw conveyor-feeder capable of withdrawing material from any of three ground lime storage bins was installed. Ground lime was fed to a bucket elevator which raised it to sufficient height for delivery to a belt conveyor crossing the Norfolk and Western tracks mentioned elsewhere. A conveyor bridge was installed to support an 18-in. belt conveyor approximately 145 ft. in length. Access to the bridge was provided at either end and the conveyor was shielded against the elements by the use of Barber-Greene Armco housing.

The material delivered by the belt conveyor joins the discharge from the ball mills and is elevated to a feed bin equipped with two screw feeders. The rate of flow into the feed bin is controlled by a Bindicator. Each of the feeders delivers the combined ball mill product and unmilled raw material to a 10 ft. dia. Gayco mechanical separator. By means of this arrangement the hammermill product, which has a screen analysis of approximately 35 percent minus 100 mesh, passes through the separators before reaching the tube mills thereby decreasing the load on the mills, increasing the size of the feed material, and increasing mill capacity.

Inclusion of the ball mill discharge with the unmilled raw material in the feed to the separators makes it possible to rely on the separators for fineness control. As a result of this arrangement the ball mills may be overloaded and their capacity increased. The separators thus serve a dual purpose without duplication of equipment.

Fines from the mechanical separator pass to another elevator and thence via screw conveyor to storage before hydration. Tails from the separators are delivered directly to the ball mills, are discharged to join the raw feed after milling, and are processed in closed circuit.

The installation is made in such a manner that either or both of the feeders preceding the air separators may be operated. Either or both of the ball mills may thus be operated at capacity. A policy has been inaugurated that sub-capacity operation of the two units is not desirable. The use of electric "ears" on the tube mills was tried with the object of increasing the nicety of control and thereby increasing the capacity. The nature of the operation was such that no particular advantage was noticed and this method of control was later abandoned.

Interlocking Central Control

The entire installation is controlled from a central point by an ingenious interlocking arranged by H. W. Smith, vice-president in charge of operations. One operator, normally located at the hammermill, has within his range of vision a system of lights which indicates the condition of operation at all units above described. Time delay relays insure proper operating speeds along the entire flow, improved maintenance cost, and superior fineness of product. Results obtained in operation of the new installation have a marked effect upon the further steps in the processing of the material and simplify the problem of quality control. A substantial saving in labor has been accomplished.

The construction program for this phase of operation has been carried on under the direction of Mr. Smith, who has been responsible for the coordination of the program and for holding the amount of lost time during the changeover to a nominal figure. Atherton & Evans, consulting engineers, Annville, Penn., prepared the plant study and, upon the adoption of their recommendations, specified the equipment and designed the installation. Howard Shocky and Sons, Winchester, Va., were the construction contractors.

Marquette Expansion

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., recently announced that during 1953 the company will expend over $2,500,000 on major improvements at five plants. Expansion will include capacity increases at its plants at Cape Girardeau, Mo., and Cowan, Tenn.

At Cape Girardeau, annual clinker producing capacity will be increased by approximately 100,000 bbl., by installation of equipment designed to improve rock crushing and kiln burning efficiency. These improvements will boost annual capacity to about 1,500,000 bbl.

Similarly, kiln efficiency at the Cowan plant will be improved with new equipment which will increase clinker producing capacity by about 50,000 bbl., raising the annual capacity to nearly 1,000,000 bbl.

Other expansion includes three new packing plants to be built at St. Louis, Mo., Memphis, Tenn., and Nashville, Tenn. Over $500,000 will be spent for modernization of the St. Louis shipping plant, including new packing and loading facilities and a new dock and captive barge arrangement.

Packing and loading facilities at the Memphis plant will be modernized to the same extent as at St. Louis. Four additional storage silos, each of 10,000-bbl. capacity, will also be built.

The new packing plant for Nashville, as at St. Louis and Memphis, will include the latest facilities for cleaner and more rapid packing and loading of all types of cement for both bulk and packaged shipment.

Also included in the program are appropriations for additional stripping and other equipment at several quarries, and for numerous smaller improvements at all Marquette plants.

Pennsylvania Producers Annual Meeting

Business meeting of Pennsylvania Stone Producers Association and annual meeting of Pennsylvania Aggregates Producers discuss legislation, percentage depletion and markets

THE ANNUAL BUSINESS MEETING of the Pennsylvania Stone Producers Association and the annual meeting of the Pennsylvania Aggregates Producers were held at the Hotel Penn-Harris, Harrisburg, Penn., January 28, 1953.

From left to right: H. H. Wagner, general manager of the Pennsylvania Stone Producers Association; Paul I. Detwiler, New Enterprise Stone & Lime Co., New Enterprise, president of the association; Bob Garman, Tyrone Lime & Stone Co., Tyrone, vice-president; and H. M. Binkley, Binkley Bros. Inc., East Petersburg, treasurer of the association

Stone Producers Meeting

The stone producers meeting, which was held in the morning, was presided over by Paul I. Detwiler, president. After welcoming the members and guests, Mr. Detwiler reviewed the activities of the past year in which the association participated: percentage depletion; the competitive aggregates situation; and the revised specifications by the Pennsylvania Department of Highways. Following Mr. Detwiler's report, H. M. Binkley, treasurer, reported on the fiscal affairs of the association.

H. H. Wagner, general manager, reported on the tonnages of crushed stone, gravel and slag sold to the Pennsylvania Department of Highways in 1952, as compared with 1951 sales. The following tonnages were given: stone, 1,862,925 tons in 1952, compared with 2,283,668 tons in 1951; gravel, 290,229 tons in 1952, compared with 191,611 tons in 1951; and slag, 465,556 tons in 1952, compared with 695,152 tons in 1951. Average cost per ton of stone in 1952 was reported as $2.49, compared to $2.11 per ton in 1951; average cost of gravel, $2.27 per ton in 1952, compared with $2.31 in 1951; and average cost of slag, $2.60 per ton in 1952, compared with $2.89 in 1951. In 1950, average costs per ton were $2.30 for stone, $2.21 for gravel and $2.82 for slag.

A survey of the tonnage reports for assessment purposes showed that while direct purchases by the highway department decreased during 1952, over-all tonnages increased from 4,900,000 to 5,200,000 tons.

Mr. Wagner also reported that three new active members had joined the association during the past year, namely: Valley Quarries, Inc., Chambersburg, Penn.; Joyce Brothers Contracting Co., Wampum, Penn.; and Valley Forge Stone Co., Malvern, Penn. Three new associate members were also acquired. Announcement was also made of the release of the revised and expanded 1953 "Industry Directory" for the Pennsylvania Stone Producers Association and the Agricultural Limestone Division.

The meeting was concluded with an election of officers. Mr. Detwiler was re-elected president. Other officers elected were Robert B. Garman, vice-president; Walter H. Fehr, secretary; and H. M. Binkley, treasurer. Those elected to the board of directors were W. E. Wilson, J. C. Showalter, John D. Teeter, F. I. Narehood, Lewis M. Nauss and Adam Eidemiller. Those named to serve on the executive committee were Lewis Nauss, H. M. Binkley, H. H. Wagner and Paul I. Detwiler, chairman.

Left to right: Ralph Binkley, Binkley Bros. Inc., East Petersburg; S. Howard Brown, Brown, Davis & White, Lebanon; F. E. Wholaver, Whiterock Quarries, Inc., Pleasant Gap; and D. E. Smith, Juniata Limestone Co., Mifflintown

Aggregates Meeting

The annual meeting of the Pennsylvania Aggregates Producers began at 12:00 with a joint luncheon with members of the construction and allied industries. Over 250 members and guests attended the luncheon and afternoon meeting. President Paul I. Detwiler presided and opened the meeting with a word of welcome and introduced a number of the governor's cabinet members and friends.

The first speaker on the program was Charles C. Smith, speaker of the Pennsylvania House of Representatives, who discussed the difficulties encountered by a legislator when he endeavors to carry out the will of the people individually, as against the commitments he made to his constituents as a whole when a political candidate.

C. H. Buckius, chief engineer, Pennsylvania Department of Highways, discussed the construction, reconstruction and maintenance of highways for 1953. He deplored the fact that so little of the federal gas tax money, supposedly obtained for highway construction and maintenance, was returned to the state for that purpose. Mr. Buckius also presented the estimated requirements of aggregates and other materials for carrying out the 1953 Pennsylvania road-building program. Among the requirements

(Continued on page 118)

Theory and Practice of

By VICTOR J. AZBE*

LIME MANUFACTURE

Part II. Effect of size on time of reheating, calcining and overheating

IN THE PRECEDING series of tests (Part I, February issue) the effect of temperature in relation to time for specimens of equal size and surface area was evaluated. In the present series, as charted in Fig. 6, the effect of size variation is presented. Furnace temperature was maintained constant at 2100 deg. F.; the size of cubes varied between 1-2 in. In all other respects the tests were run in the same manner.

In general, what was to be expected was found: a 2-in. cube of 8 cu. in. volume required quadruple the time of a 1-in. cube with 1 cu. in. volume. To obtain conformity some of the curves are slightly shifted to allow for minor differences of weight, size and thermocouple position. Any change, however, was most carefully considered and evaluated against other tests.

Since preheating laps over into calcining period and this in turn partly overlaps overheating period, it is impossible to obtain the precise length of each. But preheating and calcination periods combined may be determined fairly closely and are plotted as the lower curve with time against temperature.

It is plain that a portion of lime in the outer layers is calcined while the inner portions are preheating; this is more pronounced in the smaller than in the larger pieces.

The smaller cubes preheated, as well as overheated, faster than the larger cubes. One would expect this since surface is in excess in the expression $\frac{\text{Surface} \times \text{Temperature difference}}{\text{Volume}}$. The calcining zone temperature was highest for the 1-in. cube; the rate of penetration of zone of calcination was highest.

The following tabulation gives the essential information taken from calculated data based on average of test data.

The mean temperature difference between furnace and the center of the piece was obtained by means of a planimeter and was found to be about the same for all samples.

The surface per cubic foot of volume, as noted, is only half for the double-sized 2-in. cubes as for 1-in. cubes.

Required penetration of zone of calcination is double, reducing surface conductance to half. Thus for the 2-in. cube, with surface half and penetration double, the time required is fourfold.

In general it may be stated that in the calcination of a specific type of stone under given heat transfer conditions, there are certain main factors which promote calcination and certain others which impede it, as presented by the following formula.

$$\frac{\text{Surface [sq. in.]} \times \text{Temp. diff. [deg. F.]} \times \text{Time [min.]}}{\text{Volume [cu. in.]} \times \text{Penetration [in. (mean)]}}$$

TABLE I. HEAT TRANSFER RATE

Specific gravity of stone 2.258 — Temperature 2100 deg. F.

Test sample	A	B	C	D	E
Size of sample—in.	1.00	1.25	1.50	1.75	2.00
Volume of sample—cu. in.	1.00	1.953	3.375	5.359	8.00
Surface area—sq. in.	6.00	9.375	13.50	18.375	24.00
Mean temp. diff. °F.—average from tests	556.9	556.9	556.9	556.9	556.9
Time of preheat & calcination—minutes	25.35	39.6	57.0	77.6	101.4
Area of surface—sq. ft./cu. ft. of solid volume	72.0	57.6	48.0	41.14	36.00
Ratio $\frac{\text{Surface} \times \text{Temp. diff.}}{\text{Volume}}$	1.00	.800	.666	.572	.500
Ratio $\frac{\text{Surface} \times \text{Temp. diff.}}{\text{Volume} \times \text{Penetration}}$	1.00	.644	.447	.329	.252
h=B.t.u./sq. ft./hr./°F.	1.47	13.98	11.65	9.98	8.73

Those that promote completeness of calcination are:

Surface. Exposed parts which gather in the heat; the more surface for a given volume the better.

Temperature difference. Establishes heat flow potential, which depends also on heat transfer conditions.

Time. Period of calcination.

Those that impede calcining termination are:

Weight or volume. The relative measure of amount of heat required for the particular stone.

Calcining depth. The semi-thickness of stone when in cubical or a spherical form or some modification in oblong form.

C. A constant for stone of the particular shape and calcining facility; may be modified by suitable factors for other shapes and other heat and temperature requirements.

The formula would apply to complete calcination of individual pieces. It would not apply to incompletely calcined lime, since some of the factors are not straight-line functions. Thus it would not apply to lime calcined with 1-in. core remaining within a 2-in. cube, since the core requires a disproportionately long time to calcine, besides other considerations.

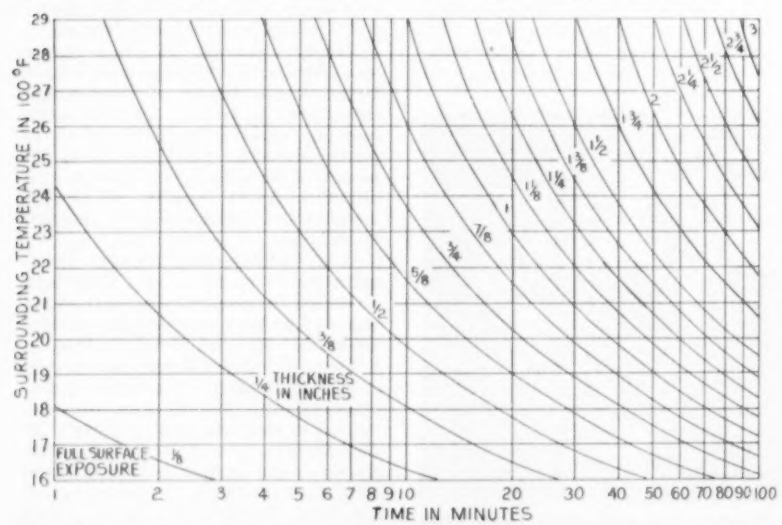


Fig. 7: Showing effect of size and temperature on calcination and preheating time for cubical stone of specific gravity 2.656 (small size stone)

*President, Azbe Corp., St. Louis, Mo.

Thus calcination is not a simple process of heating of a homogeneous substance. There is a chemical reaction and some portions of the sample may react more readily than others. Then during calcination there is a change of density, heat capacity and conductivity.

Combined Effect of Size, Temperature

Figs. 7 and 8, one for small sized stone and the other for large sized stone, show the combined effect of size and calcining temperature on rate of calcination for cube-sized specimens. The curves are based on the previously discussed tests but are adjusted for a heavier, more normal density stone. Only preheating and calcination time is given, which is for the heat transfer conditions prevailing during the tests and full surface exposure. Stone in neither the vertical or rotary kiln has a full surface exposure although exposure in the vertical kiln is far greater than in the rotary. A vertical kiln may have as much as 50 percent of its surface active, meaning that the calcining time would be twice that shown by the chart under the same temperature and heat transmittance conditions.

To find to what extent surface exposure determines the rate of calcination, compare a ½-in. cube, which according to this chart would calcine at 2500 deg. F. in about 3 min., with the small pebbles still containing core that have passed through a rotary whose hot zone temperature was considerably in excess of 2500 deg. F.

Such charts could in fact be used to evaluate the temperature within the rotary kiln bed. While the gaseous mass may be close to 3000 deg. F., sections within the bed the entire length of the hot zone will hardly be over 1600 deg. F. This must be so or the small pebbles would not carry core. If brought to the surface, the high temperature would cause their almost instantaneous conversion to lime.

The charts show that the rate of calcination is tremendously greater at high than at low temperatures, but that the same high rate of calcination is obtainable at low temperature if size of stone is reduced. Of course, if the smaller size is exposed to higher temperature the rate would be still greater, but the quality of the lime must be considered. It is best to sacrifice some of the possible high rate obtained through high temperature and accomplish results through stone size modifications. If a kiln is of suitable design, very high rates of calcination are obtainable at 2100 deg. F. and even lower.

Effect of Shape of Stone

It is often imagined that thickness of stone alone determines the calcining time, but that is far from being

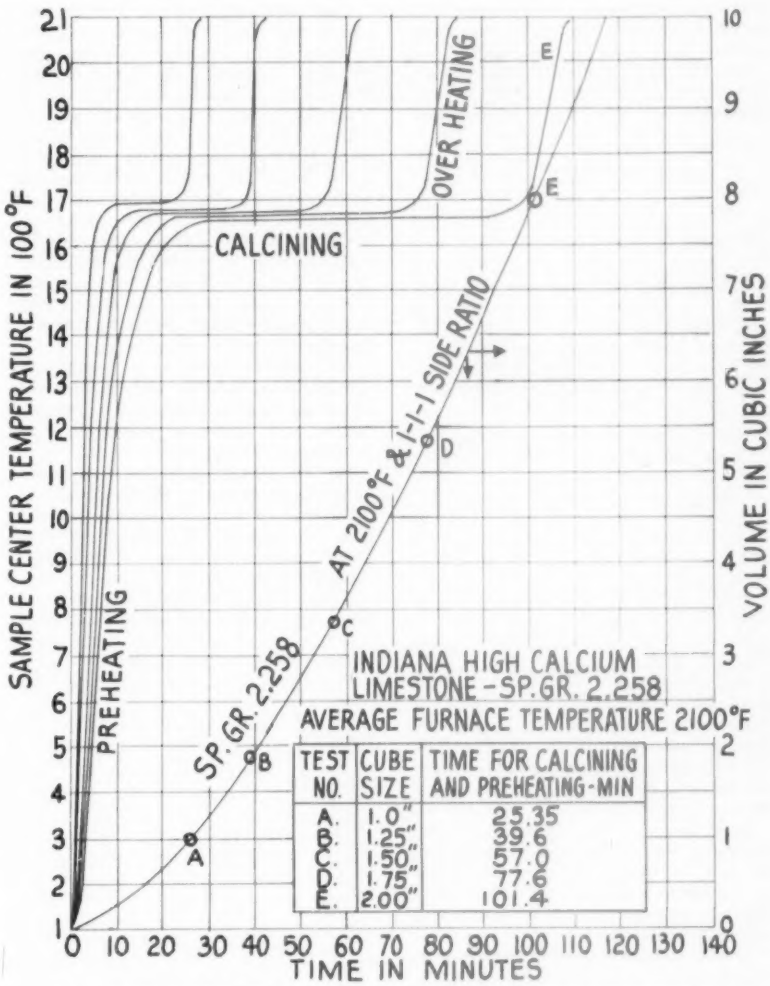


Fig. 6: Curves showing effect of size on rate of preheating, calcining and overheating

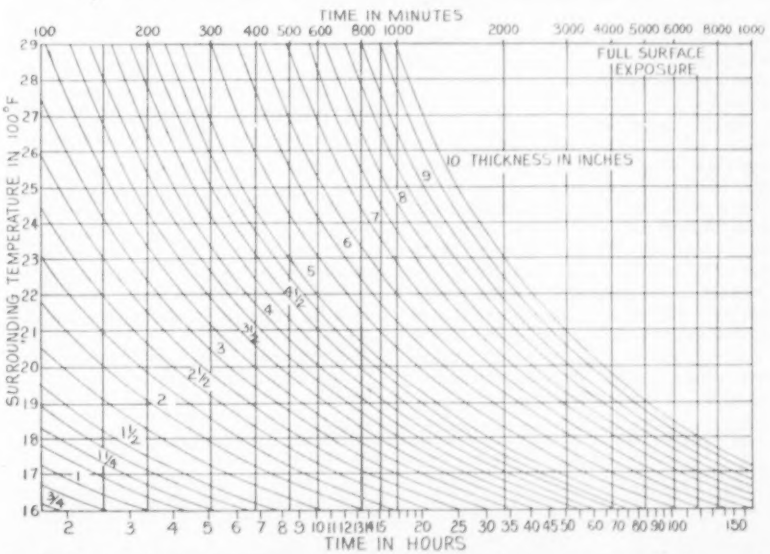
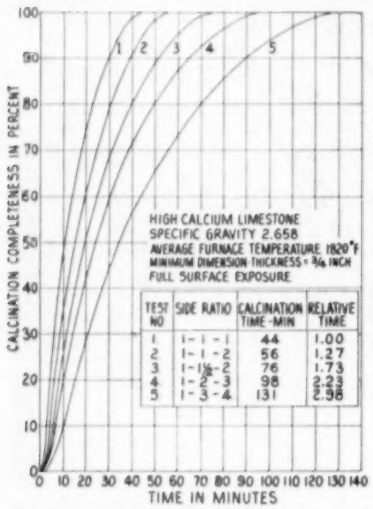


Fig. 8: Effect of size and temperature on calcination and preheating time for cubical stone of specific gravity 2.656 (large size stone)

the case. It should be readily apparent that a 3-in. thick slab will require a greater time than a 3-in. cube.

The slab embraces more volume and so requires more heat, and it presents relatively less surface to absorb the



TEST NO	SIDE RATIO	CALCINATION TIME-MIN	RELATIVE TIME
1	1-1-1	44	1.00
2	1-1-2	56	1.27
3	1-1½-2	76	1.73
4	1-2-3	98	2.23
5	1-3-4	131	2.98

Fig. 9: Effect of shape of stone on rate of calcination

heat. Combined with this is the fact that the mean penetration distance is greater as well. Thus large slabs which tend to pass through jaw crushers always present calcination problems.

It is only for any specific volume of stone that a slab form is better, as it is of lesser thickness. Thus, it has a lower calcining depth and with this a greater outer surface in relation to the volume than a cube.

These differences are usually ignored, but they should be carefully noted and considered in stone plant arrangements, in crusher adjustments, in screen opening size, and in screen opening shape selection. These charts, theoretical as they may appear, reveal directly proper size of kiln stone selection.

To evaluate the effect of shape a series of tests was run with sawed samples ranging from ¾ x ¾ x ¾ in., that is 1:1:1 side ratios, to ¾ x 2¼ x 3 in., or 1:3:4 side ratio. Dense stone was used. Tests were run at a constant temperature of 1820 deg. F. Samples were preheated in the furnace and weighed continuously during calcination. Results are presented in Fig. 9, plotted with weight loss in percent of degree of calcination against time, and results correlated by the following tabulation.

The thicknesses of all samples are equal, but the surface for a given volume of the 1 x 3 x 4 slabby piece is only about half that of the cube. If calcining depth be equal to the semi-thickness, as is generally assumed, not offering any additional resistance, the time required for the 1:3:4 piece would be double, corresponding to the surface available for each unit of volume, or 88 min., but actually it is 131 min. The difference is the resistance due to additional calcining depth. Thus it is not the thickness but the mean depth combined with surface reduction in widening slabs of equal thickness that counts.

The effect of shape is further illustrated in Fig. 10, which gives the calcining time at 2100 deg. F. for full exposure of stone of varied size and varied side ratios.

As an example, under the stated condition, stone 2 in. thick, 6 in. wide, 8 in. long (1:3:4 side ratio), requires 6 hr. to preheat and calcine. Broken in two it would require but little over half the time.

This effect of shape, we believe, applies to rotary kilns as well, but not

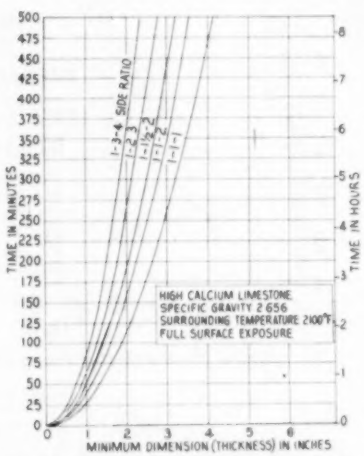


Fig. 10: Curves showing calcining time variation with respect to varied size and side ratios

so much as to vertical kilns. In the case of a rotary kiln, it is not so much a matter of what surface the individual piece of stone possesses as what surface the *stone bed* possesses, meaning the surface in exposure to the flame and to the walls. Nevertheless, it must be a secondary factor, while in the case of a vertical kiln bed that has voids open to heat flow it is the primary factor.

(To be continued)

TABLE II. EFFECT OF SHAPE OF EQUAL THICKNESS STONE ON TIME OF CALCINATION

¾-in. Basic size=thickness=1 Const. temp. 1820 deg. F. Stone sp. gr. 2.656

Nominal side ratio	Actual volume cu. in.	Actual surface sq. in.	Calcining time minutes	Relative time factor	Surface Volume	Surf. x Time Volume	Surf. x Time Volume ratio
1:1: 1	0.4293	3.423	44	1	7.97	351	1.0
1:1: 2	0.8635	5.745	56	1.27	6.66	373	1.06
1:1½:2	1.352	7.668	76	1.73	5.68	432	1.23
1:2: 3	2.618	12.406	98	2.23	4.74	465	1.32
1:3: 4	5.298	21.802	131	2.98	4.12	539	1.53

Pacific Northwest Lime Production and Market

THE PUBLICATION of "Lime for Pacific Northwest Industries," Resource Report No. 6, was recently announced by Raw Materials Survey, Portland, Ore. The report, prepared by Leslie C. Richards and A. O. Bartell, incorporates several sections of an engineering study made by Leslie C. Richards, in January, 1950, entitled, "The Feasibility of Burning Lime From the Marble Creek Limestone Deposit, Baker, Ore." It also incorporates material from various other published articles pertaining to lime. Special acknowledgement was given to Nathan C. Rockwood, editorial consultant, ROCK PRODUCTS, for much of the supporting material on the industrial uses and specifications of lime, taken from his article entitled, "Lime," written for "Industrial Minerals and Rocks," A.I.M.E., 1949.

The Raw Materials Survey was organized in April, 1947, to provide a means for furnishing factual information on raw materials for existing and prospective industries in Oregon and southern Washington. This report is chiefly concerned with lime production and market in the Pacific Northwest states of Oregon, Washington and Idaho. Past lime production of the area, current producers, and producers from outside the area shipping to this market are briefly discussed. The area's present and possible consuming industries are listed along with notes on their processes and lime requirements.

Lime manufacture in the Pacific Northwest has not kept pace with the demand. In the three Pacific Northwest states there are only two lime producers and, according to the report, their combined output is little more than half the area's requirements. The rest is imported from other sections of the United States and from Canada. As a result, on a price basis, Northwest consumers pay about 40 percent more than the national average.

Planned and possible developments, such as expansion in the pulp and paper industry, additional steel scrap melting plants, new wood chemicals production, bauxite processing facilities and sewage treatment plants, will all be large consumers of lime. Calcium carbide expansion alone is expected to boost the 1953 total annual requirements to nearly 100,000 tons. Present production is only about 55,000 tons per year. The conclusion is that the Pacific Northwest is in need of additional lime capacity.

Builds Crushing Plant

J. H. OLDHAM, who owns a 100-acre stone quarry near Liberty, Mo., is building a $100,000 crushing plant at the quarry site. Capacity will be 200 tons of crushed stone per hour.

Crushing Practice and Theory

Part XIV. Comparison of gyratory and jaw crushers as primaries

By BROWNELL McGREW*

NO DISCUSSION of primary crusher selection would be complete without a comparison of the two leading types: the standard gyratory and the Blake jaw crusher. Although their fields of application overlap to a considerable degree (at least in the realm of primary crushing) there is no real conflict between these two machines; one supplements the other and, between them they very effectively cover an imposingly large proportion of the entire field of primary crushing applications. This does not mean that other types, such as the sledging rolls, for example, are not better suited for certain applications; but there are very few primary crushing jobs to which the gyratory or jaw, or both of them cannot be applied with at least a fair degree of satisfaction.

Either of the two types can be built to handle the hardest and toughest rock or ore that can be economically mined or quarried. The jaw crusher, because of its box-frame construction, and simple toggle mechanism, is especially well adapted to extra heavy design for the crushing of extremely tough materials: in this respect it holds some advantage over the gyratory type, because the extra strength necessary for such work can be built into it at less cost than is required for the gyratory with its more complex shell castings. However, cases where extreme brute strength enters into the selection problem are relatively rare, either type can be used for the great majority of materials encountered in crushing practice, either in standard form or in reinforced design. Strengthening of these machines for extra-heavy duty follows certain well established practices which have been proven to be necessary or desirable. Usually it is a matter of selecting stronger metals, or adding weight in the frame, or both; seldom is it necessary to change the proportions of the working mechanism.

In most cases selection of one type or the other can be made on the basis of performance characteristics, receiving openings, space requirements, and so forth, without regard to relative strength of design. In choosing between the two for any specific application it is helpful to have a list of the salient features of each type, in a form that will permit quick and easy comparison. The following lists emphasize the favorable characteristics of each machine.

*Allis-Chalmers Manufacturing Co., Los Angeles, Calif., district office.

Features of Gyratory Crusher

(1) High capacity per dollar of investment.

(2) Annular discharge opening minimizes slabbing; makes for more cubical product.

(3) Shape of receiving openings favorable for slabby material. This, plus point 2, gives the machine a distinct advantage over the jaw for handling thinly stratified stone.

(4) Long receiving openings, plus large area, tend to minimize bridging. See also the comments under "Transportation Equipment and Feeding Methods."

(5) Double receiving openings permit dumping from two sides of crusher.

(6) Relatively low flywheel effect minimizes starting peaks; also allows the machine to stop quickly when power is cut off due to over-loads caused by tramp iron or choking.

(7) Machine can be serviced by simple overhead crawl-type hoist, whereas jaw crusher requires crane with travel in two directions to properly handle parts.

(8) Relatively high pinion shaft speeds permit use of higher speed motors, and lower-ratio drives.

(9) Lubrication is simpler and more economical than is possible to achieve in the jaw crusher.

(10) Cost of foundation will usually be lower than for the jaw crusher.

(11) Necessary safety guards are less extensive than for the jaw crusher.

Features of Jaw Crusher

(1) Large receiving opening per dollar of investment.

(2) Shape of receiving opening favorable for blocky feed. This, plus point 1, give the jaw a definite advantage over the gyratory, except in the very large sizes, for handling rock of massive formation.

(3) The jaw crusher is more easily adjusted, to compensate for wear of liners. This is particularly true in the larger sizes, and the range of adjustment is greater in all sizes.

(4) The jaw crusher does not lose any of its "new-condition" throw when the babbitt wears in the main, or in the pitman, bearings.

(5) The jaw crusher will handle sticky or dirty feed better than the gyratory, there being no diaphragm below the crushing chamber on which such material can pack.

(6) Routine maintenance and repair jobs are generally more easily accomplished on the jaw crusher than on the gyratory. Major repairs are about a standoff.

(7) For crushing extremely hard, tough materials extra strength can be built into the jaw crusher at less extra expense than in the gyratory. So-called "standard" designs, i.e., unreinforced, are usually more rugged than the standard design of gyratory.

Advantages and Disadvantages

Neither machine is particularly well suited to handling very soft, or "mushy" materials, although the jaw crusher is superior to the gyratory for such service. Loosely cemented minerals, such as soft sandstone, will not work well in the gyratory crusher; packing on the diaphragm behind the pipe is almost certain to cause trouble. The jaw crusher will handle rock of this character if it is reasonably free-flowing. The action on all very soft materials is inclined to be sluggish and, unless it is at the same time of a free-flowing nature, packing in the crushing chamber is an ever present hazard.

The jaw crusher will handle rock and ore containing a considerable proportion of loam, or similar contamination, provided that the admixture is not so viscous that it builds up on the jaw plates. The gyratory should never be used for materials containing more than a small percentage of such contamination, the allowable amount being that which the clean crushed rock will keep scoured off of the diaphragm. Flushing the diaphragm will prevent packing of this dirty material, but this practice is usually not permissible in the crushing plant.

We have had occasion to use the expression, "comparable sizes," a number of times in this work, with reference to comparisons between two types of crushers, particularly the jaw and gyratory types. This expression has been used by many writers on the subject—usually without any attempt to define exactly what it implies. As a matter of fact, it is a difficult term to define with any degree of accuracy. The Old Quarryman says, "It means two machines, one of which you would buy if you didn't

(Continued on page 118)

RESEARCH

By T. YOSHII*

On Burning Mechanism in Rotary Kiln

SINCE THE INVENTION of the rotary kiln by F. Ransom (1873), we have no comparable machinery other than the rotary kiln for cement manufacture. Therefore, it is most important to study the cement rotary kiln again.

The author has attempted to obtain detailed heat balances in the respective burning stages of a rotary kiln, not by means of the usual static gross heat balance sheet, but by many-sided extensive researches.

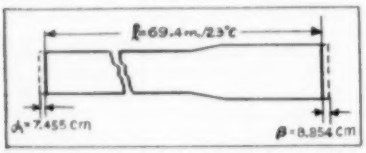


Fig. 1: Measurement of kiln shell elongation

Heat Balance of the Rotary Kiln

Research (on the heat balance of the kiln in normal operation) was carried out at the plant of Chichibu Cement Co., Ltd., in Japan before the second world war, on both dry and wet process kilns.

The sizes of the kilns in question and the operating conditions at the time were as follows.

Table I. Size of the rotary kilns investigated (in meters)

Item	Dry process		Wet process	
Size	Diameter	Length	Diameter	Length
	3.048 / 3.600	x 69.400	2.850 / 3.450	x 60.900
Type	Reflex		Unax	

Various studies have been attempted on the heat balance of the cement rotary kiln, principally by Profs. Randis, Meade, Martin, Johum, Nacken, Bussmeyer, Gilvert, Gygi and others. However, results from those studies have not always conformed; especially, the radiation and convection heat losses from the shell of the kiln and the cooler have varied markedly. The reason is that nearly all the authors mentioned determined the heat loss from the kiln and cooler shells by the difference of the total heat input and outgoing heats after summing up all the items, except heat loss from the kiln and cooler shells.

For experiment, in this case, inside temperatures of a kiln as calculated from the heat loss from its kiln shell became about 3000-5000 deg. C. in an extreme case, which is, of course, nonsense.

The author paid special attention to this point and attempted to determine the correct temperature[1] of the kiln shell by the "elongation method" he developed. This was done by measuring the elongation of the kiln shell when hot, at normal temperatures and when not in operation. Thus, its radiation and convection heat loss was easily calculated, the other items of heat balance being calculated by the common way hitherto practiced.

Fig. 1. Measurement of elongation of the kiln shell

α and β=elongation at a normal running condition in centimeters;

l=original length of the kiln shell

Table II. Working condition of the same kiln

		Dry process (percentages)			Wet process (percentages)		
		Raw mix	Dust	Coal ash	Raw mix	Dust	Coal ash
Ig. loss		32.55	9.25	2.57	35.30	24.40	3.80
SiO_2		14.66	20.20	41.72	14.40	19.01	43.00
Al_2O_3		3.56	8.16	31.22	3.69	5.32	27.09
Fe_2O_3		1.62	2.44	5.04	1.51	2.10	5.58
CaO		46.00	54.55	9.02	44.00	47.40	11.36
MgO		1.00	1.25	2.46	1.00	0.90	3.43
SO_3		0.91	3.82	6.66	0.00	0.85	3.89
Total		100.29	99.67	98.69	69.00	99.98	98.15
H.M.		2.32	1.77	0.12	2.24	1.78	0.15
S.M.		2.83	1.91	1.15	2.77	2.56	1.32
I.M.		2.20	3.35	6.19	2.44	2.53	4.85
Raw mix	Residue on 4900 mesh per sq. cm. sieve				3.8±0.2		3.5±0.2
	Water content (%)				0.0		20.0
	Quantity of flue dust (% for clinker)				24		13
	Kind				Mixing Yubari & Sunakawa half and half		
Coal for burning	Caloric value (k.cal.)				7350±50		
	Residue on 4900 mesh per sq. cm. sieve				10—12		
	Ash content (%)				9±0.5		
	Specific quantity required in dry state (kg./1000 ton clinker)				240		270
Rotary kiln	Mean output 1000 tons clinker per hour				19.109		15.877
	Speed (r.p.h.)				41±2		45±2
	Inclination (%)				4.5		4.0
Primary air	Temp. (deg. C.)				60		40
	Ratio to total air required (%)				30		26
	Speed ejected (m./sec.)				40		41
Flue gas	CO_2				26±2		24±2
	CO				0.0		0.0
	O_2				1.0		1.2

Table III. Coefficient of thermal expansion of the kiln shell (mild steel) as measured by dilatometer

Teating temp., deg. C.	Expansion coefficient (%)
23	0.000
70	0.024
100	0.047
150	0.124
200	0.202
250	0.277
305	0.367

at a normal temperature, no working time in meters.

Total elongation:

$7.455+8.854=16.309$ cm.

$69.4\text{m}\times\delta=16.309$ cm.

where δ=expansion coefficient (%) at x deg. C., $0.16309/69{,}400=0.235\%$ x=222.1 deg. C.

While the mean temperature of the kiln shell obtained by a surface pyrometer was 204.4 deg. C. as shown in Table IV, the conversion factor becomes

$$\text{Conversion factor}=\frac{\text{Temperature obtained by surface pyrometer } (T_s)}{\text{Temperature obtained by elongation method } (T_e)}=204.4/222.1=0.92$$

Therefore, mean temperatures obtained by a surface pyrometer (T_s)

Table IV. Temperatures measured on a dry process kiln shell

Measurement position	1	2	3	4	5	6	7	8	9	10	11	12	
Distance from raw mix inlet (m)	0.3	3.0	11.3	19.3	28.1	37.8	47.3	52.8	55.8	59.1	62.8	68.3	
Temp. (deg. C.) measured by surface pyrometer	135	166	189	222	234	224	141	212	218	258	183	245	
	139	168	184	225	244	231	137	216	220	263	191	243	
	137	162	192	227	242	227	148	209	223	265	184	250	
													average
Mean temp. (T_s)	137	165	188	225	243	227	142	212	220	262	186	246	204.4
Actual surface temp. (T_e)	149	179	204	245	264	247	154	230	239	285	202	267	222.1

$T_e=T_s/0.92$

*Chichibu Cement Co., Ltd., Chichibu, Japan

are about 92 percent of the actual temperature (T_a) obtained by the "elongation method," $T_a = T_s/0.92$

Why doesn't the surface pyrometer show the actual temperature? It is evident as the thermal junction of the surface pyrometer was calibrated in a hot oil bath, when it is applied to the surface with such a very steep temperature gradient, shall it be shown as the actual temperature?

Though surface temperatures of any point on the shell can be measured by the "elongation method," by means of dividing the kiln shell into many small sections or adopting the diameter of any cross section of the kiln shell, the surface pyrometer was used here optionally, for convenience sake.

Once the actual temperatures of the kiln shell were decided, the radiation and convection heat losses[2] were easily calculated by the formulas of Nusselt, Wohlenberg, Langmuir or W. H. McAdams, as shown in Figs. 2 and 3.

Table V shows a heat balance of the dry and wet process at a normal running condition, and Figs. 2 and 3 show the hourly heat balance of the respective zones under the same conditions.

If the rotary kiln stopped for a short time a great deal of heat in the kiln is radiated without delay; eventually, of course, it would reach ambient temperature. Therefore, if the kiln stops during its production, its heat balance naturally is thrown off.

Nevertheless, it is the custom in Japan to stop rotary kilns at least once a month for maintenance. The heat balance becomes somewhat poor by this periodical stopping.

According to the author's study, usually about 0.45 percent of the burning coal or 8000 kcal/1000 tons clinker in the dry process, 0.15 percent or 3000 kcal/kt.cl must be excessively added to the burning coal in a normal running condition.

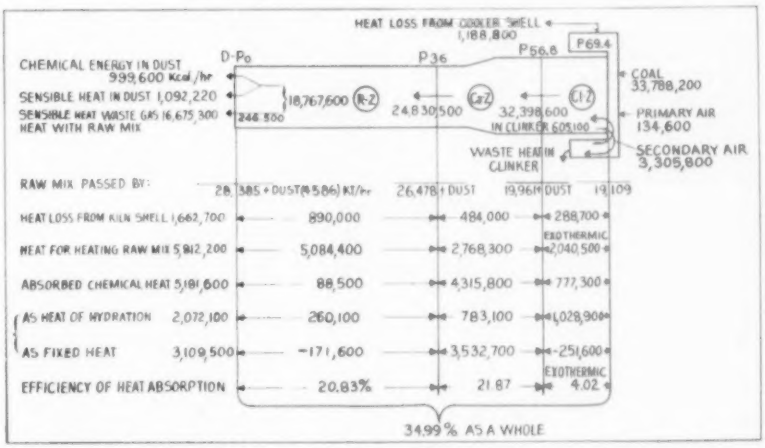


Fig. 2: Hourly heat balance recordings of respective burning zones in a dry process kiln

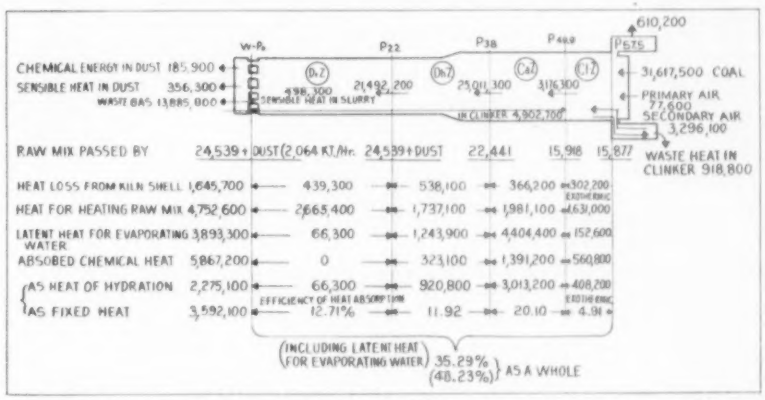


Fig. 3: Hourly heat balance recording of respective burning zones in a wet process kiln

In Japan in 1949, the heat required for burning cement clinker averaged about 2000 kcal/kg. of clinker for the dry process and 2200 kcal/kg. of clinker in the wet process, respectively, owing to the deterioration in quality of coal (about 5500 kcal/kg. mean) and shortage of coal production; this limited kiln usage to about two weeks per month at the most.

Table V. Heat balance in dry and wet process rotary kiln

	Heat gained		Heat lost		Percent		Remarks
	Dry	(wet)	Dry	(wet)	Dry	(wet)	
	kcal/kg. clinker						
Heat from combustion of coal	1765.3	(1987.7)	—		99.11	(98.27)	
Sensible heat brought in by coal	2.9	(3.7)	—		0.16	(0.18)	Both 70 deg. C.
Sensible heat brought in by raw mix	12.9	(13.8)	—		0.73	(0.68)	60 and (40) deg. C. respectively
Sensible heat brought in water in slurry	0	(17.6)	—		—	(0.87)	
Total	1781.1	(2022.8)			100.00		
Heat carried out by hot clinker from cooler	—		74.4	(57.9)	4.18	(2.86)	380 and (300) deg C., resp.
Heat loss from cooler shell	—		62.2	(38.4)	3.48	(1.90)	
Heat loss from kiln shell	—		87.0	(103.6)	4.89	(5.12)	
Heat utilized in heating raw mix	—		304.2	(299.4)	17.08	(14.80)	
Latent heat of evaporating water in slurry	—		0	(245.2)	0	(12.12)	
Chemical energy in clinker	—		271.2	(369.6)	15.23	(18.27)	
Chemical energy in dust	—		52.3	(11.7)	2.93	(0.58)	
Sensible heat carried out by dust	—		57.1	(22.4)	3.21	(1.11)	947.1, 719.6 deg. C., resp.
Sensible heat carried out by waste gas	—		872.1	(874.6)	49.00	(43.24)	
Total			1781.1	(2022.8)	100.00		

In Japan in 1949, the heat required for burning cement clinker averaged about 2000 kcal/kg. of clinker for the dry process and 2200 kcal/kg. of clinker in the wet process, respectively, owing to the deterioration in quality of coal (about 5500 kcal/kg. mean) and shortage of coal production; this limited kiln usage to about two weeks per month at the most.

Burning Mechanism of Cement Clinker

1. Chemical change of cement raw meal in the rotary kiln.[3] In order to determine the burning mechanism of cement clinker in the rotary kiln, the following tests were carried out.

a. Total analysis of 28 samples of the raw mix in the kiln, 13 samples of which were in a dry process and 15 samples of which were in a wet process kiln.

b. Quantitative analysis of the soluble part, except $CaCO_3$ and free CaO, in the same samples mentioned above.

c. From above tests combining states of CaO-SiO_2-Al_2O_3-Fe_2O_3 systems were ascertained as in Fig. 4.

All the clay and limestone in the kiln, both dry and wet process, are not always apt to react; they react with each other after a gradual decomposition. The characteristic curve of combining CaO-SiO_2-R_2O_3 in Fig. 4 evidently shows this fact, i.e., the reacting curve moves first in the direction of increasing SiO_2, then in the direction of increasing CaO again.

X-ray analysis and microscopic observation of raw meal in the kiln. The author also attempted to investigate the burning mechanism of cement clinker in the rotary kiln, both dry and wet process, with the aid of microscope and x-ray. The results are summarized in the diagrams shown in Figs. 5 and 6.

In making a summary, the burning mechanism of cement clinker in both types of kilns is considered as follows.

a. There is no substantial difference in clinker formation between the dry and wet process, but the reaction with the wet process is more speedy and more systematic, on the whole.

b. The grain of clay or dehydrated quartz was enclosed as a nucleus by many a fine particle of free CaO de-

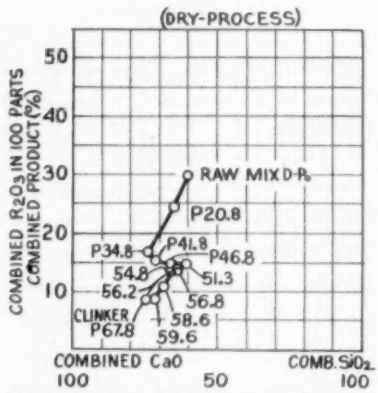


Fig. 5: Diagram of burning cycle in rotary cement kiln (dry process)

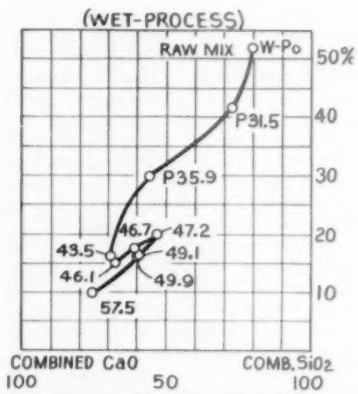


Fig. 6: Diagram of burning cycle in the rotary cement kiln (wet process)

composed from limestone, then it develops to a ring of the belite group.

c. Some grains of clay or quartz enclosed by a belite group combine with more CaO to become alite, and some pore was found behind the spot of clay or quartz grain sometimes.

d. A little later than the belite formation, celite development was observed. At first, C_2F seems to be a main component of the celite, but as a growth of alite, celite undergoes a change to contain a quantity of calcium aluminate, and at last reaches the following composition:

1 mol of C_2F + about 0.4 mol. of C_3A_3

It is considered that the CaO required in this stage shall be supplied by the CaO decomposed from C_3A in the presence of C_2F.

Physical change of cement raw mix in the kiln.[4] Physical changes of raw mix in the kiln, such as specific gravity, specific weight, specific heat, appearance, color, heat of solution and heat of hydration, are almost coincident with the chemical change. The specific gravity of raw mix both in dry and wet process kilns gradually increases with the burning, though the wet process increases the sp. gr. rapidly.

Belite begins to form when the color of raw mix begins to turn grey (dark green in powder state).

Specific heat of raw mix in the kiln gradually decreases with the progress of burning, but a sudden drop is observed in the clinkering zone.

Specific heats of the clinker lie between 0.213-0.184 in the dry process and 0.207-0.193 in the wet process.

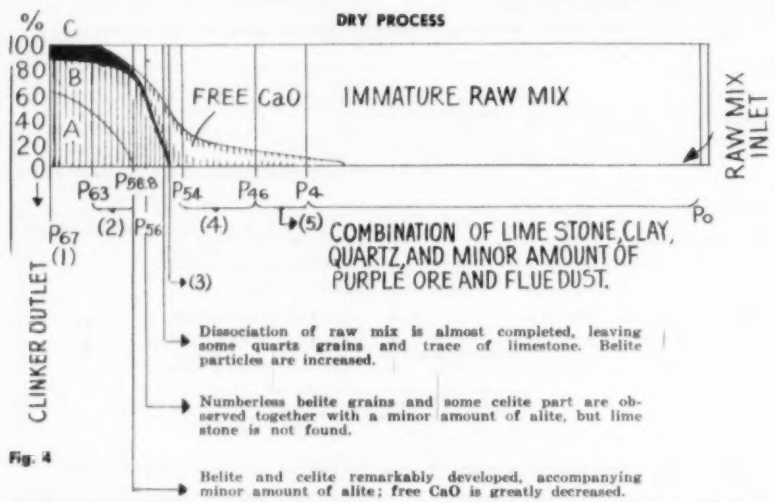
Heat of solution of clinker is as follows. The lesser quantity of the heat of formation in the dry process is due to the recovery of dust.

	Dry process	Wet process
Heat of solution (cal./g.)	612.8	626.1
Heat of formation (cal./g.)	281.1	369.5

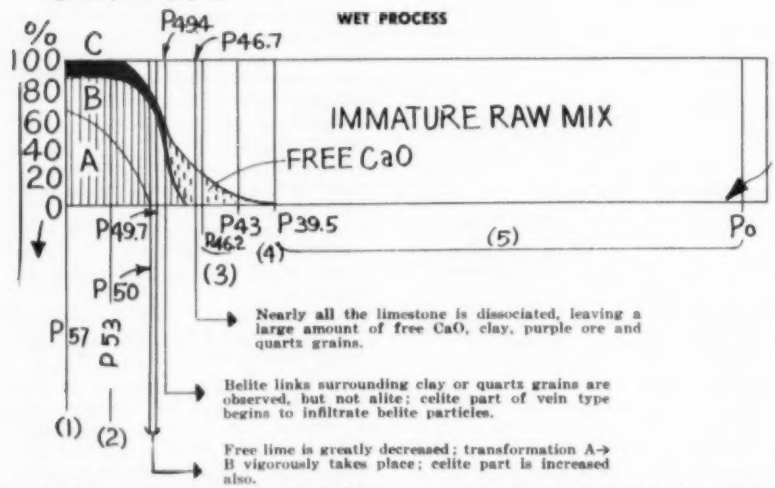
Heat of hydration of the raw mix in the kiln was derived from the difference between the heat of solution of the original sample and its completely hydrated state in an adiabatic

(Continued on page 129)

Fig. 4



(1) Finished clinker (consisted of A, B & C) is somewhat porous than wet clinker; mineralogical structure is also not so regular as that of wet clinker.
(2) Clinkering reaction is remarkably advanced; transformation of belite→alite is vigorously taking place.
(3) Links of belite nuclei occur, and germs of celites are also observed.
(4) Amorphous free CaO and undecomposed lime stone coexist, leaving clay and quartz grains as they were.
(5) Dissociation of lime stone begins.



(1) Much dense clinker consisting of A, B & C without free CaO.
(2) Transformation B→A is remarkably advanced; celite part of vein type is developed.
(3) Belite occurs around quartz and clay particles; no low lined silicates such as CS are recognized, but particles of celite are found.
(4) Dissociation of lime stone begins.
(5) Mixture of lime stone, clay, quartz and purple ore, without containing free CaO. Spalling of lime stone by heat is observed.

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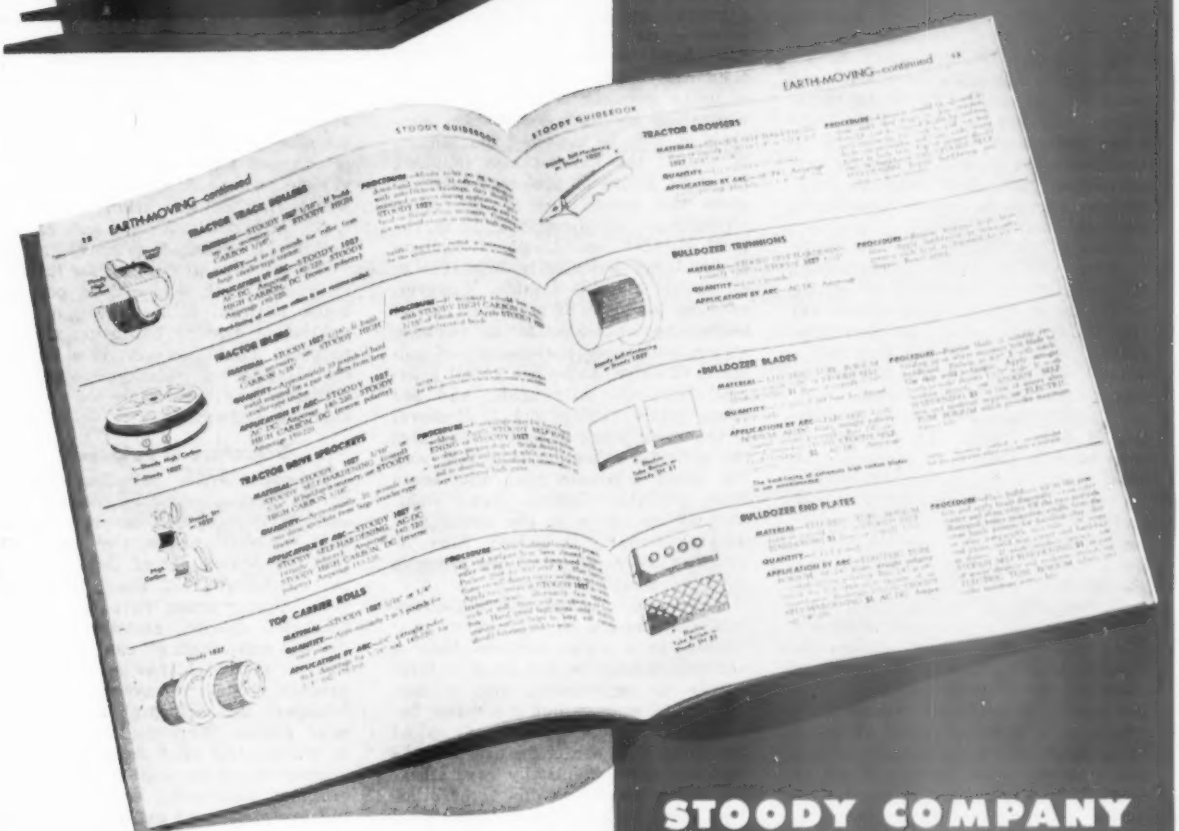

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PROSPECTIVE CHEMISTRY

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Part VI. Silicates with three-dimensional lattices or frameworks—quartz and feldspar

By NATHAN C. ROCKWOOD

THE PRIMARY STRUCTURAL UNIT in all silicate rocks is the silica tetrahedron, as illustrated and described in previous articles of this series. There are five main classifications, or kinds of tetrahedra grouping, as already described in detail in the January issue article. Strings or chains of tetrahedra are considered as having only one dimension—length. Sheets of tetrahedra made up of cross-connected chains thus have two dimensions—length and width. When these two kinds of structural unit are built into tangible pieces of rock or mineral they are chemically bound together, but not by bonds between the silicon cations and the oxygen anions of the different units in the manner that the silica tetrahedra are bonded together in the units themselves. The bonds between the separate chains or the sheets of silica tetrahedra are usually formed by ions of sodium, potassium, calcium, magnesium, aluminum, or other positively charged ions (cations).

None of the bonds between these interface cations and the oxygen ions of the silica tetrahedra is as strong as the bond between the silicon cation and the same oxygen ions. The reason for this is that silicon has a valency of four and is attached by four single bonds to four oxygen ions, or is said to have a coördination number of four; hence the strength of each bond is unity (or one). On the other hand a single ion of sodium, for example, has a valency of one and has a coördination number with oxygen of six, which means its bonding power to an oxygen ion is only one-sixth of unity. It follows, therefore, that such a bond is much more readily broken or dissolved than the bond between the silicon ion and the oxygen ion. Also, it is an ionic or electrical bond, while the silicon-oxygen bond is 50 percent a valence bond, which is a stronger kind of bond. Since calcium, with a valency of two and a coördination number of six or eight, has an ionic bond strength with oxygen of two-sixths or one-third, or two-eighths or one-fourth, respectively, these bonds are somewhat stronger than those between sodium and oxygen. That supplies a structural chemical explanation of cleavage in silicates built up of chains and sheets of tetrahedra, since the planes composed of the bonding ions between the silica chains or sheets have relatively weak bonds, compared with the Si-O bonds. When some of these bonds are hydroxyl (OH) ions, or water molecules, as happens in hydrous minerals, the bonds between the sheets or chains are especially weak.

Three-Dimensional Lattices

We closed the article in the January issue with a reference to silicates having three-dimensional lattices or frameworks, of which quartz and feldspars are the most common examples. In these silicates the bonds between Si and O extend in all directions, and a particle cannot be crushed or dissolved or melted without breaking this Si-O bond, or in feldspar its Al-O bond equivalent. Since an Si-O bond of unity strength is about as strong a bond as one finds in common minerals, it is to be expected that quartz is one of the hardest and toughest minerals. It has no planes of cleavage since the bonds are of the same strength in all directions. It is the most durable constituent of common rocks, being practically insoluble in all except alkaline liquids. However, colloidal particles of silica can be removed by abrasion, as in running water, and these suspensions of colloidal silica in water are to all practical purposes mild acids, and are often called "silicic acid." Removal of the water precipitates or coagulates the colloidal silica, and in this way the silica minerals opal and agate were probably formed. Some small part of the silica in the water suspension probably is in ionic form, or in other words some of the silica is in true chemical solution.

For some reason, still unknown, silica tetrahedra in solution or suspension in a water medium have a natural tendency to join up or to form micells or aggregates; and in that process to squeeze out the water between them, which process is called syneresis. This process is presumed to continue until eventually crystallization takes place and quartz or other crystalline form of silica is the final product. Cherts and flints are usually described as in-between products, partly crystalline or micro-crystalline and partly fibrous (amorphous). The fibrous, colloidally-derived products—opal and agate—still contain some water, but it is not too firmly bound for it can be removed by heating or otherwise drying out, without destroying the structure which holds the silica intact.

To keep the ionic and colloidal silica in a water solution, a soluble alkali hydroxide or some other soluble alkali is needed. The silica particles, having exterior surfaces of negatively charged oxygen ions, adsorb the alkali ions, which have positive charges, and the particles of silica with these adsorbed positively charged ions, which are hydrated (or surrounded by water), then repel each other or tend to remain dispersed in the solution. When something is added which has greater attraction for the sodium ions, or for the water medium, or they are removed in any manner, the silica tetrahedra again tend to link up, forming eventually a gel, which apparently enmeshes or surrounds some of the sodium or other positively charged ions, and silicate gels of various composition result. In the weathering or alteration of silicate rocks such newly formed gels can be helpful in penetrating pores, solidifying and thus preserving the integrity of the rock, as well as possibly being harmful in hastening disintegration by further hydration and expansion. That, however, is a subject more connected with a discussion of concrete than here where we are considering aggregates.

Structure of Feldspars

Feldspar is the principal mineral in all igneous rocks including many used extensively for concrete aggregate. By reference to the chart and table in Article IV of this series in the November 1952 issue, it will be noted that granite, rhyolite, syenite, trachyte, diorite, andesite, grabbo, diabase and basalt all contain 50 percent or more feldspar minerals. Aggregate producers have to deal with feldspars as such probably only as sand grains. Since feldspar is, next to quartz, the most durable common mineral in rocks, some kinds survive ordinary weathering and disintegrating processes, and grains of feldspar of commercial sand size are found in many bank deposits of sand and gravel which were derived from igneous or plutonic rocks. These grains are usually white or colorless and casual inspection probably would not show any difference from quartz sand

(Continued on page 112)

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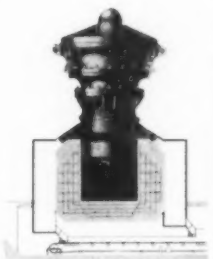

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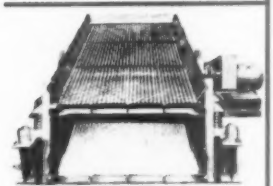

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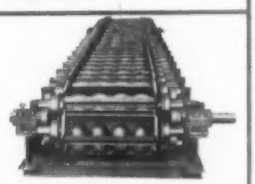

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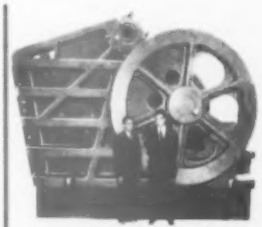

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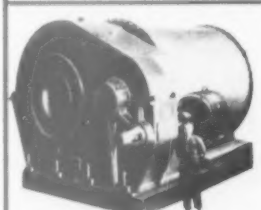

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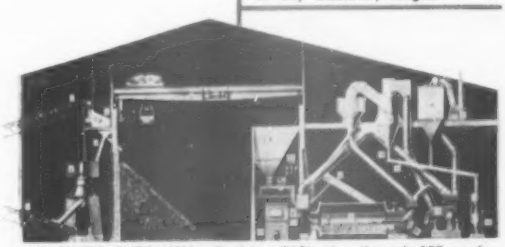

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grains. Woolf, in the paper abstracted in the November issue, gives specific instructions for distinguishing between silica and feldspar sand grains. Specific gravity varies with the composition of the feldspar from slightly below to slightly above that of quartz. Structurally the ionic framework is not so strong as quartz, hence it is not quite so hard, tough or durable as quartz, and can be distinguished from quartz by the presence of cleavage planes, which quartz does not have. There does not appear to be any fundamental objection to the presence of considerable percentages of feldspar in ordinary concrete sand, but scaling of concrete pavements in the Northeast has sometimes been blamed on too much or weathered feldspar in commercial sand.

The easiest way to get an idea of the chemical structure of feldspar is to start with quartz, SiO_2, which, as has been shown, is a tectosilicate and has a three-dimensional lattice or framework in which every oxygen ion (O) is bonded to two silicon ions (Si). Therefore, while each silicon ion is bonded to four oxygen ions to form a tetrahedron, or the silica ion, if it may be called such, is SiO_4, the chemical formula of mass silica is SiO_2, which if it existed as a single molecule would be neutral. When the chemical formula of quartz is written $(SiO_2)_{12}$, or $Si_{12}O_{24}$, which could be taken as a single cell of the mineral, it is easy to see how the feldspars are derived from the quartz lattice.

First, we have to remember that an atom of the element aluminum can have a coördination number with oxygen of either four or six; for example it may substitute for magnesium, which has six coördination, or for silicon, which has four coördination. In some minerals it occurs both ways, and this caused much confusion in the science of geochemistry until by means of X-ray analyses it was possible to distinguish the different structures. In the feldspars aluminum always occurs in four coördination, or as a substitute of silicon. Thus if one-fourth the silicon atoms in quartz are replaced by aluminum atoms, we have a chemical formula for a mineral $Al_3Si_9O_{24}$. But such a framework would be unstable for it is no longer neutral. That is, the sums of positive and negative electrical charges on the ions would no longer balance each other, for the positive charge on the Al ions is only three, while the positive charge on the Si ions is four. Thus we have three unbalanced negative charges on the O ions, which must be compensated for, if the lattice structure is to be stable.

The quartz or silica framework, however, is made up of four and six tetrahedron rings joined together, or cross-connected, so that each O ion still serves to connect two silicon ions, but this framework is so open that holes can occur in the centers of these rings, large enough to encompass other ions such as sodium, potassium, calcium, etc. Thus the electrical neutrality of the framework of $Al_3Si_9O_{24}$, can be restored by inclusion of three potassium or three sodium ions, and the formula becomes $K_3Al_3Si_9O_{24}$, or $Na_3Al_3Si_9O_{24}$, which written as chemical formulas become $KAlSi_3O_8$ and $NaAlSi_3O_8$. These are feldspars. Since the Al and Si constitute the main structural framework, it is simpler to write the formulas $K(AlSi)_4O_8$ and $Na(AlSi)_4O_8$. The first of these is the formula for orthoclase and microcline, which differ only in crystal habit, and the second is the formula for albite. Thus one is a potash feldspar and the other a sodium feldspar. Since the potassium ion is considerably larger than the sodium ion, the potassium is found only in the larger holes formed by the six silicon or aluminum-oxygen ring groups. Also, since the strength of a bond between ions depends inversely on the length of the bond, a sodium ion in the larger hole would be very weakly held.

The important factor in feldspars is thus the ratio of silica to aluminum, since that determines the number of unsatisfied negative charges which must be neutralized. Although we can find no references to bear out the theory, the silica to aluminum ratio must also have an important bearing on the structural strength and durability of the entire mineral. Thus, one cannot put all feldspars in the same classification when considering the qualities of a feldspar sand, or a coarse aggregate containing feldspar. In natural feldspars the silica to alumina ratio varies from 1 to 1 to 3:1. The feldspars mentioned above are practically never pure potassium or pure sodium feldspars, but mixtures of the two. Thus orthoclase varies from nearly pure $K\,Al\,Si_3O_8$ to crystals which contain about 30 percent $Na\,Al\,Si_3O_8$, together with various other metal cations of suitable size (Ba, Ca, Rb, etc.). The specific gravity of orthoclase is 2.57 and of albite 2.62; that of quartz is 2.65, which shows some of the effect of aluminum substitution for silicon in these feldspars.

Albite to Anorthite

A large and important group of feldspars is the plagioclase series from albite, $Na\,(Al\,Si_3)\,O_8$ to anorthite, $Ca(Al_2Si_2)O_8$. They are even more widely distributed as rock-forming minerals than the orthoclase or potash feldspars. Their composition varies greatly between the two chemical analyses noted. Some have distinct names as follows: 70 to 90 percent albite and 30 to 10 percent anorthite is called oligoclase; 50 to 70 percent albite and 50 to 30 percent anorthite is andesince; 30 to 50 percent albite and 50 to 70 percent anorthite is labradorite; 10 to 30 percent albite and 70 to 90 percent anorthite is bytownite. The various isomorphous (similar lattice) structures are possible because sodium and calcium ions are about the same size, so that one can substitute for the other, keeping in mind that one calcium with a positive charge of two is the equivalent of two sodium ions, on account of their different valences (or positive electrical charges). Therefore where calcium ions fill the cavities the number of aluminum tetrahedra is proportionately increased, so that the ratio of Si to Al in those parts of the structures must be 1:1.

However, the lattice structures are never perfect, and all the holes are not filled; hence even feldspars of approximately the same chemical composition may easily have different weathering resistances. Because they contain readily soluble ions of sodium, potassium and calcium the feldspars weather fairly rapidly. Practically all the deteriorating processes result from the introduction of water. Acid waters attack the alkalies and calcium, while alkali waters attack the silica. For the normal range of slightly acid and slightly alkaline waters, the alumina is the least attacked. The relative loss of the constituent minerals in gneiss and diabase have been determined, for example, in order of decreasing solubility, for gneiss Na_2O, CaO, MgO, K_2O, SiO_2, Al_2O_3; for diabase CaO, MgO, K_2O, Na_2O, SiO_2, Al_2O_3. It is possible that the texture of the rock, the grain and pore sizes, are more important to durability than the chemical contents. However, the more sodium in the rock, it appears, the less durable under ordinary weathering conditions.

The feldspars are formed in the crystallization of rock melts or magma, and are in their original form anhydrous. In cooling of the original melts those feldspars high in calcium separate, or crystallize first, and those high in sodium crystallize last. The feldspars high in potassium appear to be the most durable, possibly because the potassium ion is considerably larger than either the sodium or calcium ions, and consequently is less mobile. The sodium ion is notorious for its mobility, and hence it tends to migrate through the mineral or rock structure. This fact has been proved in the case of the reaction between a reactive silica aggregate and the sodium hydroxide released in the hydration of portland cement. There should be some doubt, however, about lumping the sodium and potassium oxides or hydroxides together in the results of this reaction, because the facts of geochemistry show that the potassium ion is less mobile, is more firmly bonded, and results in more durable mineral combinations.

The only purpose of this article

(Continued on page 117)

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

B. F. Goodrich steel cord belt rushes iron ore through a mountain

Belt for longer, higher, single-flight conveyors

UP THAT steep grade, through a mountainside, to a height of 17 stories, go *1,000 tons* of iron ore *every hour* — 24 hours a day. It's a B. F. Goodrich steel cord conveyor belt this heavy ore is rough-riding — a belt especially designed for the efficient handling of material under the severest conditions. Here's why B. F. Goodrich steel cord belt construction can make conveyor systems of lengths and lifts far exceeding anything formerly possible:

Strength for long hauls — In this exclusive B. F. Goodrich belt design, individual steel cords run lengthwise, each completely surrounded by rubber. These parallel cords give tremendous strength, yet are flexible so that troughing is natural, belt keeps centered on idlers, spillage is held to a minimum.

Strength for long life — Plies of nylon-filled cotton fabric, placed across belt width, act as a shock absorber, permit belt to "give" crosswise when impact occurs, prevent longitudinal tearing.

Single-flight economy—Steel cord construction now makes possible a single-flight conveyor for installations where a combination of high lifts and long distances exists. It eliminates the transfer points necessary with a conveyor system built in several stages with ordinary belts.

If you need a conveyor belt that must take severe impact on loading, and haul heavy loads up steep inclines, let your local BFG distributor show you how a B. F. Goodrich steel cord belt can do the job more efficiently and at lower cost than a system built in several flights. For the name of your nearby distributor, or for more information, just write *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.* (Available in Canada)

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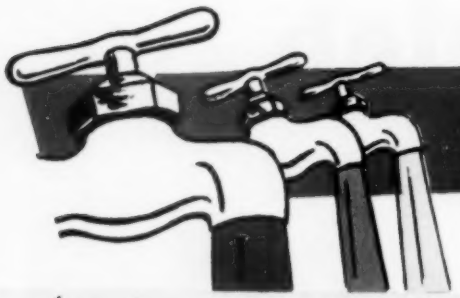
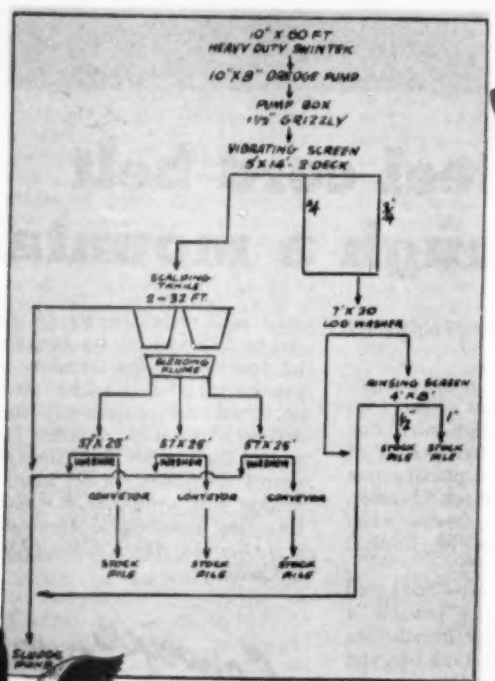
RUBBER FOR INDUSTRY



IT'S LIKE TURNING ON A



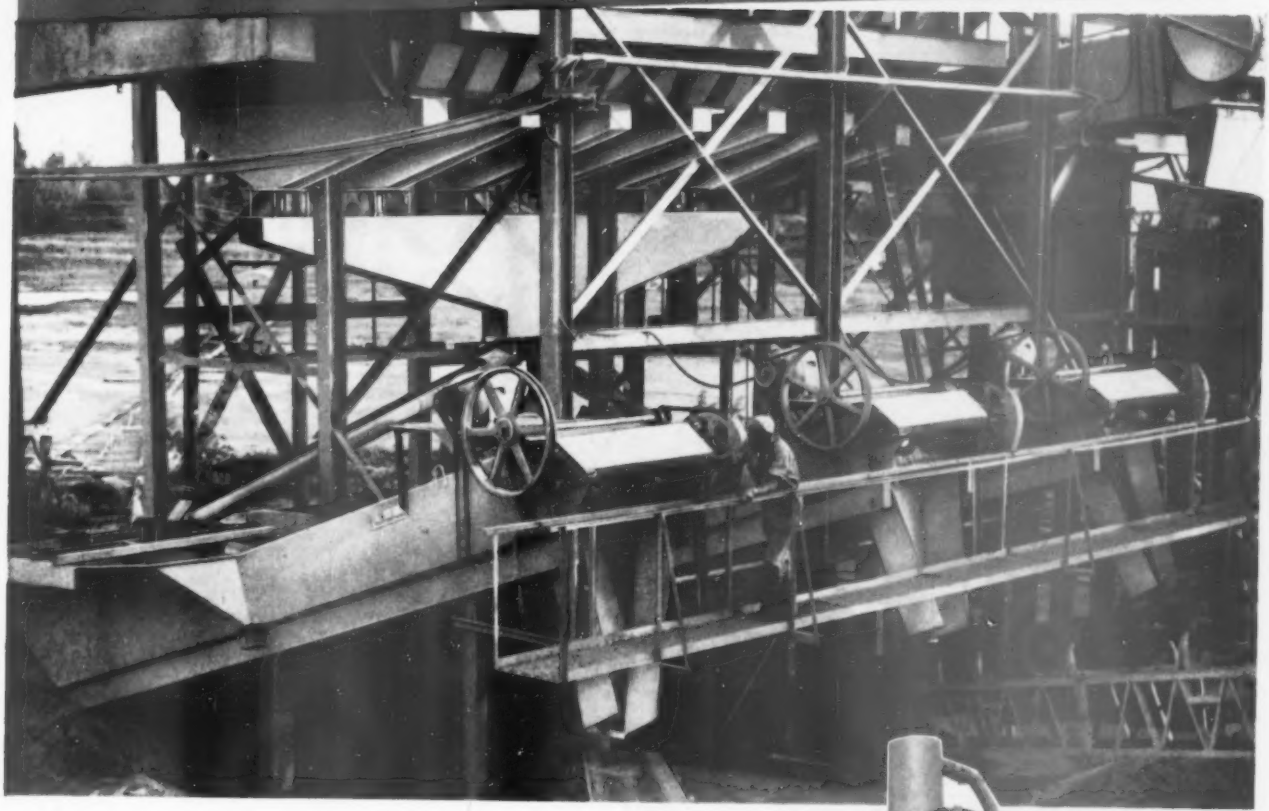
THE neat, highly efficient sand and gravel plant of Knox County Sand Co., Vincennes, Indiana, is pictured on these pages and detailed in the flow diagram at left—but, it has to be seen to be appreciated.

Material is pumped to the plant from a trim dredge equipped with an Eagle 10" — 60' heavy duty "Swintek" Dredging Ladder. The traveling chain of the "Swintek" screens the intake nozzle, eliminating shut-downs caused by boulders clogging suction line. Cutters on the traveling chain agitate the deposit increasing percentage of solids pumped. Cutters also penetrate stratas of clay when encountered. The suction line is 10" and the discharge line is 8".

The plant, designed by Eagle, is flexible—it can produce one, two or three gradations of material—one at a time or simultaneously. Dredged material is discharged in the pump box atop the plant. It is then screened. Material passing through vibrating screen flows into an Eagle 32' Double Water Scalping Tank. Sand of coarser mesh settles at the "feed box" or inlet end of tank, less coarse sand settles near the middle and fine mesh sand at the far end. Excess water flows over adjustable weirs on three sides of the tank and is carried off.

KNOX COUNTY SAND COMPANY PROFITS FROM EAGLE'S BROAD

FAUCET TO GET THE SAND YOU WANT!

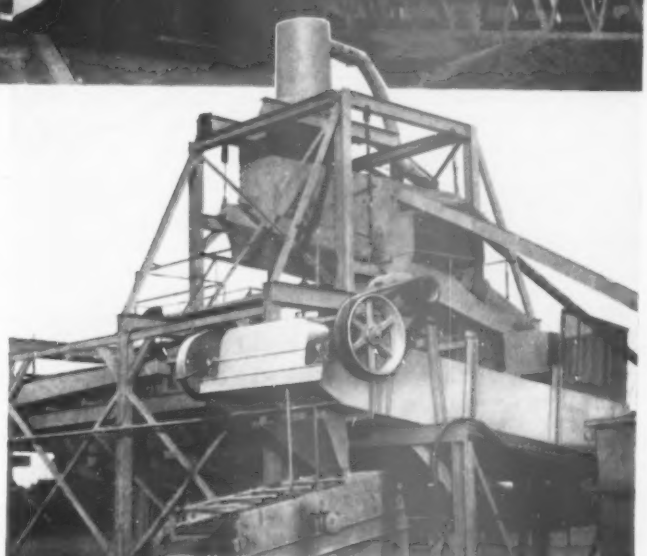


From the bottom of the tanks sand flows to gathering flumes, then through adjustable bleeder gates to a divided triple blending flume. This flume controls the ratio of the size of material troughed to the three Eagle 57" x 24' double screw Fine Material Washer-Classifier-Dehydrators.

Gravel from the screen is chuted to an Eagle 7' x 20' Log Washer, shown at right, which frees it of clay and silt.

Knox has "on tap" material to any specification. Output averages 150-tons per hr.—17% gravel, 83% sand. Concrete sand is main product, but asphalt sand, mason sand and plaster sand are also produced—just like turning on a faucet!

Difficulty, at first, with too many fines settling at the first valves, was solved by Eagle's "Follow Through" Engineering. "Rising current classification" was applied — a water inlet adjacent to the first valves to float some of the fines further along. According to C. A. Broecket, Vice-President and Cecil Parker, Operating Foreman (shown on catwalk in view above) performance is highly satisfactory — everybody is happy—especially the contractors who get the kind of sand they want. Why not investigate Eagle Equipment for your plant? Send for literature today!



EXPERIENCE AND "FOLLOW THROUGH" ENGINEERING

LEADERS IN AGGREGATE WASHING AND CLASSIFYING EQUIPMENT FOR HALF A CENTURY

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WOULD YOU CLEAN ONLY PART OF YOUR FACE?

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Prospective Chemistry

(Continued from page 112)

is to show that feldspars are structurally different from the pyroxene and amphibole silicates which may have chemical analyses similar to the feldspars. The feldspars are tectosilicates with three-dimensional lattices; the others may be altered feldspars and have insosilicate structures—that is chains of SiO_4 tetrahedra (or AlO_4 in some instances). In other words, the process of alteration or disintegration is to break down the three-dimensional framework into chains, which are less securely bonded. Since many of these geochemical phenomena have been studied, it would seem only logical to relate the data gained from them with the experience accumulated in disintegration of concrete structures.

Crushing

(Continued from page 105)

buy the other one, providing you had enough money to buy either one of them." That comes about as near as any definition. Comparable sizes of gyratory and jaw crushers are those sizes which the engineer or operator pairs off against each other when making a selection to fit his specific problem, and these pairings may not be the same for all problems. One job may involve capacity as the most important factor; the next one may demand special emphasis on receiving opening. Obviously these different requirements may call for setting up a comparison between different sizes of one or the other type.

Usually, in selecting the primary crusher, receiving opening is the prime consideration—admitting of course that capacity must be adequate. The following list is an attempt to pair off gyratory and jaw crushers on the basis of effective receiving openings, bearing in mind that each shape of opening has its advantages for certain shape-characteristics of the feed, as has been pointed out.

Comparable Sizes of Gyratory and Jaw Crushers

Gyratory	*Jaw*
20-in.	36- x 24-in.
30-in.	42- x 30-in. or 42- x 40-in.
36-in.	48- x 36-in. or 42- x 40-in.
42-in.	60- x 48-in. or 48- x 42-in.
50-in.	84- x 56-in.
54-in.	84- x 60-in.
60-in.	84- x 60-in.

Sometimes, in making a comparison of receiving openings, it is helpful to make a scale drawing of both openings, superimposing one upon the other. The rectangular jaw opening is simple and easy to layout. To draw the gyratory opening, it is necessary to know the top diameter of the crushing head; to make a complete sketch, the diameter of the spider hub and the width of the spider arms should

(Continued on page 137)

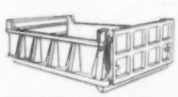
NEW HOIST RATINGS prove St.Paul best!

Tear out this ad . . . use it to compare St.Paul's "bonus capacities" with any other hoist. You'll find St.Paul gives you *far more payload capacity per lb. of weight — at all body lengths!* Your truck dealer, or St.Paul distributor will also show you why St.Paul's advanced mechanical and hydraulic improvements mean *lower installation costs, added hours of smooth, trouble-free performance.* Get the complete story on these great new St.Paul dump body hoists today, or write for free illustrated folder. St.Paul Hydraulic Hoist, Customer Service Dept., 36123 Main St., Wayne, Michigan.

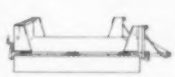
St.Paul Hoist Ratings

Model	Wt. lbs.	Payload tons at body lengths shown									
		7'	8'	9'	10'	11'	12'	13'	14'	15'	16'
B-16	550	7	6								
H-16	650		9								
H-18	735			8	7	6					
H-20	795			10	9	8	7				
L-20	870			12½	11	10	9	8			
L-24	1020				12	11	10	9	8		
2 H 20	1370				17½	15½	14	13	12	11	10
2 L 20	1555				22½	20	18	16	15	14	13
2 L 24	1695				27½	24½	22	20	18	17	16

...also check St.Paul's complete new line of matching dump bodies



MODEL 301 Triple-strength contractor's body with pyramid side braces and boxed corner posts.



MODEL 106 Drop-side body with hinged sides and tail gate for easy hand loading with shovel.

MODEL 103 Combination dump and platform body with removable sides and corner posts.

MODEL 311 Heavy-duty rock-type body with scoop end for easy dumping of bulky loads.

OUR 41ST YEAR

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St. Paul HYDRAULIC

Hoists and Dump Bodies
Fax-all Refuse Loaders
Elevating Front Gates

oldest in reputation . . . newest in cost-saving features

Penn. Meetings

(Continued from page 101)

were: sand, 1,190,468 tons; bituminous concrete, 1,581,975 tons; cement, 2,148,102 bbl.; and total aggregates, 9,889,872 tons.

Other speakers included W. A. Warrick, chief construction engineer, who reviewed past methods and difficulties encountered in highway construction; N. A. Staples, chief maintenance engineer, who discussed some of the maintenance problems with which the department was faced; and W. H. Herman, chief research engineer, who discussed the highway department's revised coarse and fine aggregate specifications. He assured the producers that they would have a year in which to dispose of present stockpiles produced under the old specifications.

Turnpike Construction and Specifications

Two representatives of the Pennsylvania Turnpike Commission discussed the construction of the turnpike. John D. Paul, assistant chief engineer, reviewed the history of the turnpike construction and announced that the commission expected to construct a north-south turnpike in the near future. George A. Rahn, chief materials engineer, reviewed the construction methods and the specifications for the materials which were used in the construction of the turnpike. He pointed out that, due to service behavior, it had been necessary to make many revisions in the aggregate specifications as well as in the methods and types of construction. One of the more recent and major changes was the specifications governing the insulation material which will be used in future turnpike construction. He stated that this material will have to be a carefully prepared and well graded aggregate, meeting rather rigid requirements.

The meeting was concluded with a speech by Carlyle Gray, Pennsylvania Department of Geology, who discussed the early formation of the state's high calcite stone and the reason for the variations in the formations as found today.

Left to right: A. E. O'Brien, executive secretary, Associated Pennsylvania Constructors, Harrisburg; H. H. Wagner; Harold Turner, president, Pennsylvania Slag Association, Harrisburg; C. H. Buckius, chief engineer, Pennsylvania Department of Highways, and N. A. Staples, chief maintenance engineer of the Department of Highways

Transporting cement in light metal pressure-tanks on special truck chassis

Pneumatic Tanks for Bulk Cement

By J. GRINDROD

INTERESTING METHODS for the bulk transport of cement have been developed in Sweden in recent years by one of the leading cement producers AB. Skånska Cement. In addition to placing in service specially designed tanker ships for carrying cement along the Swedish east coast from the Stora Vika factory to Stockholm and other ports, the firm has developed a new "Interconsult System" of bulk transport by truck.

The tanker craft are equipped with automatic, electrically-operated devices and conveyors for handling cargoes. These can be worked by only two men, one aboard ship, the other ashore. The ships are also equipped with bagging machinery which can be used when the port of discharge has no bulk storing facilities.

The bulk system of transport by highway involves hauling from factory to silo at the building site in steel or light metal pressure-tanks mounted on trucks. Quick and dustless unloading is effected by means of pneumatic devices installed on each vehicle. The trucks are equipped with two or three vertical tanks with a total capacity varying from 5 to 14 tons. In combination with a tank trailer the capacity can be increased up to 28 tons. Special arrangements at the factory provide for quick loading, while the cement is elevated pneumatically into a silo at the building site at a rate of up to one ton per minute. These silos form part of the system and are delivered in standard sizes, most of them equipped with mechanical arrangements for weigh-batching the cement. They are also fitted with devices for the automatic feeding of the cement into the hopper or concrete mixer, manual shuffling from the weigher being required only if electricity is not available.

As well as taking up less space than bagged cement, the silos have the added advantages that they save labor, can be placed up to 130 ft. away from the truck delivery point and they eliminate the need for paper bags and the untidy litter of empty bags about the site. Losses through flying dust are also eliminated.

One man, the truck driver, can attend to the discharge of the cement from truck to silo and the quicker turn round also increases the transport capacity of the truck.

Apart from the compressor there are no moving units in the discharge machinery and this is an advantage in view of the abrasive nature of cement.

Invented by Helmuth Carlsen, one of the technical experts of Skånska Cement AB, the system has been patented in many countries. It is now used for transporting about 50 percent of all cement delivered in the larger Swedish cities and has been exported abroad.

Free Lime Distribution

J. CALLEJA of Madrid, who has made a collection of cement clinkers burned in various ways, has laboriously separated the grains into three fractions from the outer shells, from the cores and from the intermediate part of the grains. He finds generally the most free lime in the cores and the least in the shells. This was reported in *Zement-Kalk-Gips*, July, 1952, p. 206.

Facts prove the economy of RUST-OLEUM®

Apply Directly Over Sound Rusted Surfaces

Just scrape and wirebrush to remove rust scale and loose particles — then brush Rust-Oleum 769 Damp-Proof Red Primer *directly over sound rusted surface.*

Lasts Longer Applied Directly Over Rust

Sandblasting, chemical pre-cleaning and other costly preparation methods are *not* usually required. Rust-Oleum penetrates the rust to bare metal, incorporating the rust particles into the coating.

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Rust-Oleum finish coatings incorporate the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer. They provide *double protection* and enable you to *beautify as you protect.*

Practical Answer to Your Rust-Producing Conditions

Rust-Oleum resists rain, snow, heat, fumes, sun, salt water, and chemicals. So easy to use by brush, dip, or spray that one man often does the work of two.

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Indoors and out, Rust-Oleum has proved its capacity to stop rust! Rust-Oleum can do the same for your tanks, metal sash, stacks, girders, roofs, buildings, machinery, pipes, etc.

An Exclusive Formula

Rust-Oleum is *distinctive* as your fingerprint. It incorporates a specially-processed fish oil vehicle that *dries,* is *odor-free,* and is formulated in *many colors.* Specify Rust-Oleum — accept no substitutes.

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SUCCEEDING WITH SAFETY

A talk to the plant operating force:

By A. J. R. CURTIS*

WHETHER WE ARE HERE TO ORGANIZE from scratch a first class plant safety organization or whether the business before the house is to build up still further our good safety organization of the past that is not proving equal to the requirements of the present or expectations of the future, the job and the responsibilities before us are about the same. We are here to build for the future an organization that will far exceed any results obtained in the past. I think you will agree.

Some of the Prerequisites

How well your safety organization succeeds in ditching accidents depends largely on how much you want it to succeed. You cannot make an undertaking of this kind prosper, even in a limited sort of way, unless every man on the payroll backs the plant safety committee and its program to the limit. Less than that won't do. This is an old theme the truth of which appears more fully and more clearly as time goes on.

You cannot "get by" if the men and women at the plant are just "for safety" in a nominal sort of a way. Every individual must be an ardent and dynamic safety worker, purposeful and full of resolution, with safety always in the forefront no matter what else goes on. The entire plant personnel must be committed to the safety program, each member ready to take any part or place to which he may be assigned. Any member who is unwilling to take his part should have his head examined.

The years directly ahead will carry accident hazards far greater than any with which we have had to deal in the recent past. Almost everywhere young untrained and inexperienced men are replacing older men at quite a rapid rate. Where this is found to be actually true, there is no time to lose in setting up a superior safety training program. This program should be arranged principally as a series of well planned meetings for the new men. All experienced safety leaders should agree.

It is a king's size job to banish personal injury mishaps from anybody's factory, shop or plant. Such a job is relatively even more difficult when applied to the heavy industries, such as those which make up the readers of ROCK PRODUCTS. Many of the operating units in such organizations include large quarries, stone and coal mining operations, heavy railroading and trucking; calcining at 2700 deg. F., and large grinding and pulverizing mills, as most of us are well aware. The weight of the equipment and of the materials makes escape from hazardous situations slower and less likely to succeed. The rock products industries make up one of the largest peace-time users of high explosives.

In the heavy industries, falls of men or materials from high places, always relatively difficult to deal with, turn up as much more severe than in industries where much or all of the equipment is small and light. An accident occurring in a watch factory, for example, could hardly be as severe as one of the common garden variety occurring occasionally in a stone quarry. The heavier power installations, often involving generators and motors up to several hundred horse power, with their high tension feeder lines, present hazards not to be found to any appreciable extent, if at all, in hundreds or perhaps thousands of the lighter industries.

Accident Prevention Program

For success in dealing with plant accident hazards there is required, at the outset, a good analysis of current accident experience at the plant. If available, this statistical analysis should cover a period of at least five years. In case available information covers a shorter period it may be used but will, of course be less valuable. Classify the information as follows:

1. By department and by department head.
2. By type of accident
3. By range of frequency
4. By range of severity
5. By time of day and day of week
6. By age and length of employment of person or persons injured. Also by length of employment on present job.

Every progressive plant should have a small library of safety literature available for use by foremen and others who are or should be interested.

Many of the pieces selected for the plant safety library may become more useful still if purchased in quantity and distributed to individual workers over the plant. On their own, or with the help of others, workers may prepare valuable reviews of some of the books and pamphlets for presentation and discussion at plant safety meetings or elsewhere. Good books or bulletins on safety subjects, reaching the worker's home, are very often read by several members of his family and are often borrowed by neighbors, thus further extending their value.

WHAT ARE THE INDISPENSABLE QUALIFICATIONS OF A PLANT SAFETY LEADER?

Mr Curtis says:

The answer to this question is not uncommonly difficult. Character, personality, ability to analyze and organize, common sense and a natural and a cultivated liking for men are the indispensable qualifications. Add to these experience and willingness to work at least 12 hours a day; familiarity with teaching and with methods of interesting men, and you have most of the basic personal attributes required.

Of course, no safety director or safety engineer can expect to succeed in a big way unless he knows the men with whom he is working, the mechanical equipment of the plant, the workmen's environment and plant operating regulations and procedures.

The best safety director in the world can't succeed without the good will and active help of those higher up and he would be "through" at once should he fail to realize that the best safety contacts with the workman are through his foreman.

A. J. R. CURTIS

Lime Industry Survey

THE BUREAU OF MINES has announced the publication of "Information Circular 7651, "The Lime Industry," which summarizes the results of a lime industry survey made by the bureau. The report discusses the history of the lime industry; its raw materials; its distribution in the United States; methods of quarrying; production and marketing factors; and uses.

In contrast to conditions 40 years ago when the chief use of lime was for building purposes, more than 67 percent of the present production now goes into chemical and manufacturing processes, while only 27 percent is used in the building industry, according to the report. The remaining 6 percent of current production is used for agricultural purposes.

The survey also revealed that shortly after the turn of the century, about 1910, there were 1073 lime plants producing 3,500,000 tons of lime, in contrast to 168 plants producing 7,500,000 tons in 1950.

The circular is available from the Bureau of Mines, Publication Distribution Section, 4800 Forbes St., Pittsburgh 13, Penn. In ordering, the circular must be identified by date (December 10, 1952), subject and the number P.N. 32290.

*Retired assistant to general manager, Portland Cement Association.

Proved Performance

on the toughest jobs

On a wide range of jobs and under the toughest conditions, "Eucs" move more loads or tons per hour at the lowest cost. Large capacity, long life in heavy duty service, and speed on the haul and dump—these are features that assure low cost hauling and dependable performance.

Bottom-Dump Euclids have proved their rugged staying power and ability to do the toughest jobs in off-the-highway construction and industrial work. Powered by diesel engines of 190 to 300 h.p., they range in capacity from 13 to 25 cu. yds., and have top speeds loaded up to 34.4 m.p.h.

Rear-Dump "Eucs" are designed and built to move rock, coal, ore, overburden and other heavy excavation. They range in capacity from 10 to 34 tons, have top speeds up to 36.3 m.p.h. with full payload, and diesel engines of 125 to 400 h.p.

For help with your off-the-highway hauling problems, call your Euclid Distributor today or write for information on the complete line of Euclid equipment for moving earth, rock, coal and ore.

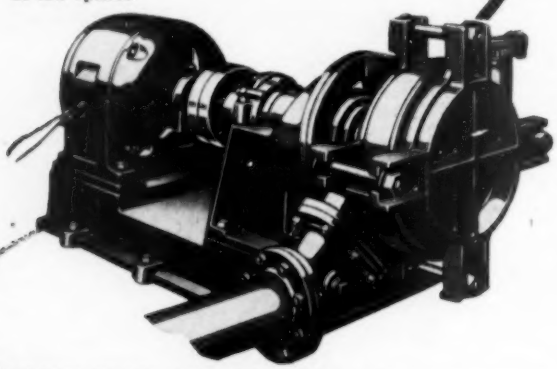
"EUCS" **are job proved for more loads per hour and more profit per load.**

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

EUCLIDS *Move the Earth*

10 REASONS WHY Morris TYPE "R" SLURRY PUMP is Ideal for Cement Mills

1. **LOW PRESSURE STUFFING BOX** — Subject to suction pressure only. Maximum packing life. No high pressures to force an excessive amount of solids into stuffing box.
2. **LOW SEALING WATER PRESSURES** — Negligible dilution of slurry when pumps are properly maintained.
3. **KEEPS FLOORS AND PITS CLEAN** — No spilling of slurry past the shaft.
4. **MAXIMUM LIFE OF WEARING PARTS** — Because the alloy is selected to suit the job — because Morris' pumps are applied to give low velocities through impeller and casing — because Morris pumps operate at low speeds.



5. **HEAVY SHAFT AND BEARINGS** — Eliminate dangerous vibration due to any abnormal operating conditions — long and satisfactory bearing life.
6. **EASY TO REPAIR** — Only four bolts need be loosened to renew impeller and shaft sleeve — not necessary to disturb piping.
7. **SAVES POWER** — In many instances able to move more material per KW.
8. **NO SEPARATE OR INTERMEDIATE SUCTION TANK REQUIRED**
9. **FLEXIBLE PERFORMANCE** — Operates satisfactorily under high positive heads or, if necessary, under a vacuum through moderately long suction lines.
10. **SAVES PIPING EXPENSE AND FLOOR SPACE** — Because the Morris Type "R" allows 72 different combinations of suction and discharge nozzle positions.

For long term efficiency — and economy . . . for simplified assembly and disassembly — and a minimum of shutdowns . . . specify Morris Type "R" Pump. Free consultation with a Morris engineer at your request.

Write for Bulletin #181

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

MANUFACTURERS NEWS

Cummins Engine Co., Inc., Columbus, Ind., has appointed E. D. Tull as vice-president and general manager, according to an announcement by Irwin Miller, chairman of the board, and R. E. Huthsteiner, president. Mr. Tull, a native of Columbus, has been with Cummins since 1928. In February of this year he was named vice-president of personnel and plant and recently was elected to the board of directors. As vice-president and general manager, Mr. Tull will be responsible for coordinating the work of the five divisions of the company.

E. D. Tull

Worthington Corp., Harrison, N.J., announces that a new division known as the mechanical power division has been set up to handle sales, engineering and production of Multi-V drives and Allspeed drives at the Oil City, Penn., plant. D. E. Tessendorf has been named sales manager of the division and H. W. Kumro, assistant manager.

Gar Wood Industries, Inc., Wayne, Mich., has moved its National Lift Co. subsidiary from Waukesha, Wis., to the recently acquired United Stove Co. plant in Ypsilanti, Mich. Manufacturing operations are under the direction of Kenneth B. True, recently elected vice-president and general manager of the United Stove Co.

American Hoist & Derrick Co., St. Paul, Minn., announces that James F. Bishop has been appointed general manager in addition to his duties as secretary-treasurer. He joined the company in 1923, was appointed secretary-treasurer in 1945 and a director in 1951.

Bemis Bro. Bag Co., St. Louis, Mo., has announced the retirement of E. H. Howell, manager of the St. Louis plant, after 44 years of service with the company. He will be succeeded by P. C. McGrath, assistant manager.

Gould-National Batteries, Inc., Trenton, N.J., has appointed James S. McCullough as sales promotion manager. He was formerly advertising and sales promotion manager of Lamson Corp., Syracuse, N.Y.

Link-Belt Co., Chicago, Ill., announces the appointment of Hubert J. McCormick as sales manager of the Caldwell plant, succeeding Erwin A. Wendell, who is currently on leave.

Kent Machine Co., Cuyahoga Falls, Ohio, has appointed Wettlaufer Equipment Ltd., Toronto, Canada, as representatives for Canada.

(Continued on page 126)

What's Your Problem?

PAYLOADERS *Do Many Jobs!*

"PAYLOADER" tractor-shovels are successfully serving every branch of the Rock Product industry, including your own. These versatile, unit-design machines are available in many sizes and types to meet your needs in the pit, the yard or indoors.

"PAYLOADERS" are completely designed expressly for tractor-shovel service, with factors of stability, ruggedness and traction never before available. They have multiple speeds in reverse as well as forward that insure faster work and bigger production, plus many other advantages.

Your nearby "PAYLOADER" Distributor is one of 200 in the United States and Canada. He has parts stocks, service shops and skilled servicemen to keep your "PAYLOADER" a profitable investment. See him today for full "PAYLOADER" facts. The Frank G. Hough Co., 705 Sunnyside Ave., Libertyville, Ill.

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Portland Cement	Ready Mixed Concrete
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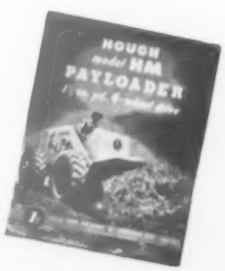
Sand and Gravel	Gypsum
Lime	Phosphate
Industrial Sand	Other Minerals

WRITE for Literature on any "PAYLOADER":

Four-wheel drive Models HM — 1½ yd. and HR — 1 yd.; Rear-wheel drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; Front-wheel drive Models HAH — ½ yd., HA — 12 cu. ft.



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THE FRANK G. HOUGH CO. · Since 1920

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CONVEYOR COMPONENTS

MAKE THE SMART MOVE

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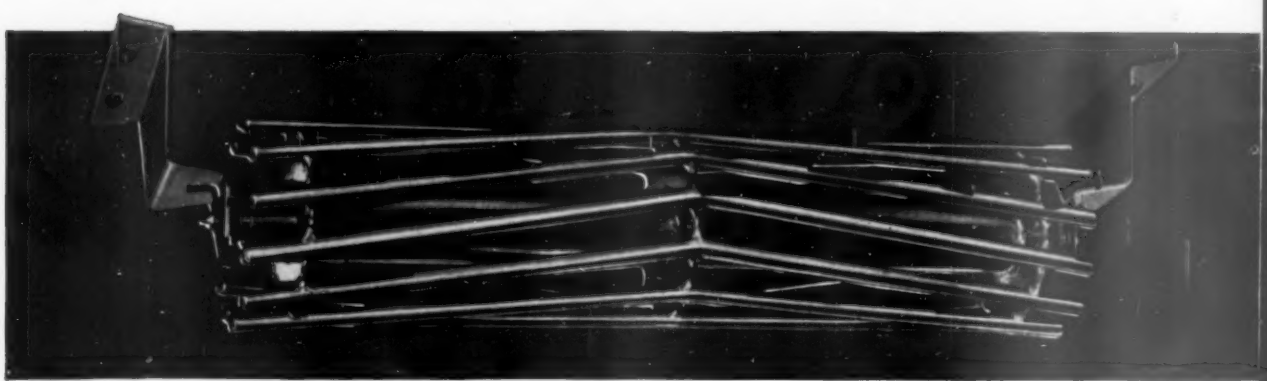
Is your conveyor in need of modernization? Are you planning to expand your present system? Does expansion of your business require a new conveyor?

Here, Barber-Greene offers you valuable assistance. Carriers, drives, truss sections, belt, accessories . . . or an entire new system . . . you'll find what you need in the complete Barber-Greene line of conveyor components.

Here are units that are quickly available to improve your materials handling operation. All units are from the complete line of Barber-Greene pre-engineered, standardized Permanent Conveyors. Why not check with your Barber-Greene Distributor —chances are excellent his large stock of conveyor components includes just what you need to revitalize your materials handling system.



EXCLUSIVE BARBER-GREENE CHEVRON ROD RETURN ROLL

A new, patented chevron rod return roll manufactured exclusively by Barber-Greene. For installation on return run of belt. B-G Chevron Rollers are self-cleaning—there is no build-up of material on the roll and consequent uneven and excessive belt wear. Open design eliminates compaction between roller and belt. Gentle slapping action of ½-inch diameter rods dislodges loose material clinging to the belt. Also exerts self-aligning action on belt. 6 inches in diameter. Ball or roller bearings. Sizes for 18, 24, 30, 36, 42, 48-inch belt widths.

Write for complete catalog

If you operate or plan to operate a conveyor, the complete catalog on Barber-Greene Permanent Conveyor Components belongs in your files. Write for your copy.

see your **B-G distributor** ...or write

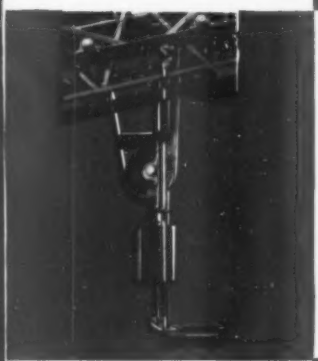
CARRIERS FOR EVERY PURPOSE

Your conveyor is no more efficient than its carriers. Selection of the kind and type of carrier depends on experience and knowledge. There are B-G carriers for every purpose—all embodying outstanding design and construction features that assure many years of low-cost operation while affording the utmost in belt protection.

BELT HOUSINGS, BELTING

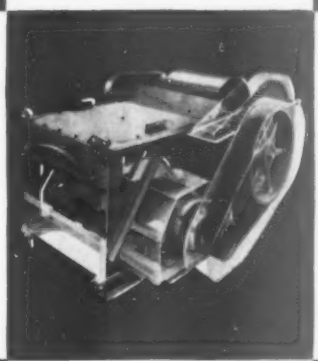
Belt housings. Safeguard against snow, ice, rain, sun and wind. Made of 16-gauge, extra heavy galvanized culvert stock. Sections hinged for inspection. Adjustable supporting clips.

Belting. Superior seamless ply, rubber impregnated duck construction makes belt alignment easy. Heavy-duty rubber covering is extra thick at edges. Widths for all conveyors.



BELT TAKE-UPS

Take-ups maintain belt tension and eliminate slack caused by belt stretching. Gravity types, which include B-G Vertical Gravity Take-ups and Horizontal Gravity Take-ups, provide constant, automatic tension adjustment. B-G protected Screw Take-ups are designed for shorter conveyors. All types have highest grade bearings and all-welded steel frames. Available for belt widths up to 48 inches.



HEAD END AND INTERMEDIATE DRIVES

To meet the requirements of any conveyor. Powered by gas, diesel or electric motors in wide range of capacities. Factory assembled package includes motor, speed reducer, pulleys, shafts, bearings and structural steel frame. Accurately aligned, adjusted and lubricated before shipment. Greatly simplifies field erection.

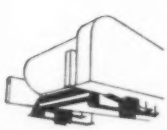
TRUSS OR CHANNEL SECTIONS

B-G pre-engineered and pre-fabricated Steel Truss or Channel Sections mean greater strength, economy, flexibility and faster erection of your conveyor. Available in 12, 24, 42, 60 and 84-inch depths—in lengths of 6, 9, 12, 15, 18 and 21 feet. Supplied with or without walkways. Both types made of welded structural steel.

FEEDERS

B-G Drag Flight Feeder uniformly conveys coal and other non-abrasives from a bin or hopper. No floor supports required . . . easily attached to overhead bin or hopper through top member flange connections of the feeder. Steel chains and bar flights drag material over 5/16" steel pan to discharge end. B-G also supplies reciprocating, belt and apron feeders.

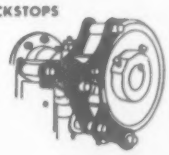
OTHER BARBER-GREENE CONVEYOR ACCESSORIES



BELT SCRAPERS

TRACK HOPPERS

SWIVEL SPOUTS



BACKSTOPS

A-FRAMES

WALKWAYS

FEEDING HOPPERS

GRAVITY SCREENS

CONTINUOUS SKIRT BOARDS

275

Barber-Greene

Aurora, Illinois, U. S. A.

CF&I

STEEL PRODUCTS FOR THE SAND AND GRAVEL INDUSTRY

GRINDING RODS

- Wear evenly
- Resist abrasion
- Rolled from special analysis steel
- Machine straightened with square cut ends
- Designed for efficient, economical grinding

CF&I Products for the Sand and Gravel Industry

Cal-Wic Wire Cloth Screens
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Grinding Balls
Grinding Rods
Light Rails and Accessories

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
THE COLORADO FUEL AND IRON CORPORATION, DENVER and NEW YORK

CF&I
GRINDING RODS
THE COLORADO FUEL AND IRON CORPORATION

1045

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the appointment of Frank E. Briber, Jr., as manager of the newly formed crushing, milling and mining machinery section. He was formerly manager of the crusher section. R. C. Edwards has been appointed engineer in charge of research and development; N. E. Croft, sales engineer in charge of the crusher group; C. A. Rowland, sales engineer in charge of the rod and ball milling group; E. M. Bolstad, sales engineer in charge of miscellaneous mining equipment and coordinator of projects for the mining industry; D. F. Carlson, product engineer of the pyroprocessing section; and A. J. Roubal, special engineer.

Le Roi Co., Milwaukee, Wis., has announced the appointment of Richard H. Koehler as manager of the advertising and sales promotion department. He succeeds Guy Scrivner, who has been made sales engineer. Mr. Koehler was formerly advertising manager of Stearns Magnetic, Inc. Frank Kuether has been named executive engineer.

St. Regis Paper Co., New York, N.Y., announces the death on October 10 of Ralph B. Maltby, vice-president and director at his home in Bronxville, N.Y. He was 76 years old. Prior to joining the company Mr. Maltby was associated with the Hanna Paper Corp., which was purchased by St. Regis in 1922, when Mr. Maltby became vice-president and a director.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., has elected James M. Mead assistant vice-president. Mr. Mead managed the New York steel service plant from 1946 until this year when he was appointed first assistant to Ainslie Y. Sawyer, vice-president in charge of purchasing, procurement and merchandising.

Link-Belt Co., Chicago, Ill., recently held open house at its new Colmar, Penn., plant, where the manufacture of custom-designed conveying and processing machinery has been put on a straight-line production basis. Engineers, industrialists and civic leaders also inspected the new plant.

Research Corp., Bound Brook, N.J., manufacturer of Cottrell electrostatic precipitators, has opened a new divisional office in Pittsburgh, Penn. H. L. Richardson has been named divisional sales manager to head the new office, which will service western Pennsylvania and the state of West Virginia.

Sauerman Bros., Inc., Chicago, Ill., announces the death on December 27 of Bert T. Macy, manager of the parts and accessories department, at his home in Chicago, after a short illness. He was 66 years old. Mr. Macy had been with the company for 31 years.

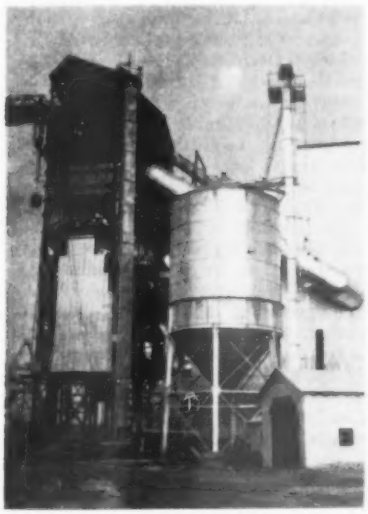
Caterpillar Tractor Co., Peoria, Ill., has appointed Jack H. Gill as assistant manager of the industrial division in the general sales department.

Folsom Dam

(Continued from page 77)

batch is mixed. The sensitivity and range in the consistency graph will show a change in slump of 1 in. based on standard portland cement. The consistency meter includes a light control system and a timing meter with 0 to 4½ min. range.

Cooling of the coarser aggregates is by cold air innundation and ice weigh batched to the mixer as required. York refrigeration equipment is used throughout. The cooling system's capacity is said to be the second largest ever built. Sand is not cooled.



Batching plant receives air-cooled aggregates. Cement cooler is at the lower left

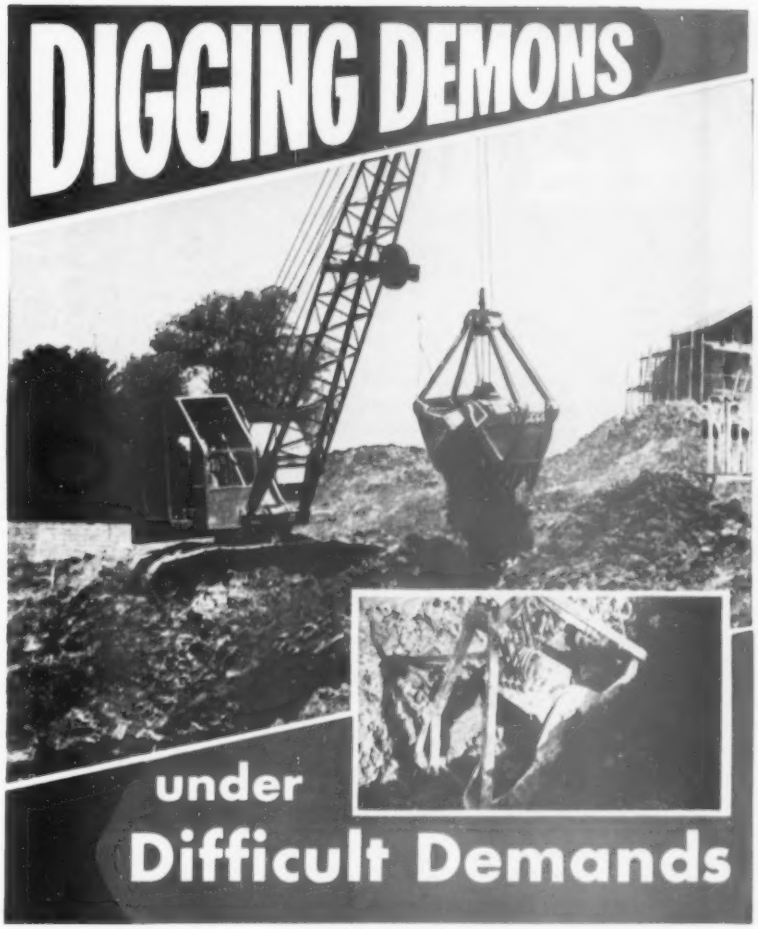
Specifications for the batching equipment require accuracy limits as follows:

Portland cement	1 percent
Water	1 percent
Minus 1½ in. aggregates	2 percent
Plus 1½-in. aggregates	3 percent
Admixtures	3 percent

The batching plant includes two bucket elevators for cement; one 14 x 8 in. with a capacity of 400 bbl. per hr., and one 12 x 7 in. with a capacity of 275 bbl. per hr. Both are provided with self-aligning bearings which are provided with adequate grease seals. Cement screw conveyors are 10 in. diameter with capacities of 275 bbl. per hr.

Concrete for the dam is placed from buckets with delivery to the hammerhead crane by rail. The crane saw previous service at Grand Coulee and Bull Shoals dam. At Nimbus dam the concrete is transported to the construction site in bottom dump buckets carried by truck.

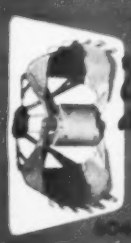
Contractors for the dam are Merritt-Chapman & Scott Corp. of New York City and Savin Construction Corp., East Hartford, Conn. The job will require 1,100,000 cu. yd. of concrete and 13,000,000 cu. yd. of compacted earth-rock fill. The concrete section across the main stream of the



The exceptional "DIG-ABILITY" of Owen Buckets has been acclaimed by crane operators and construction contractors alike since the first Owen was manufactured.

Proof of this is evidenced in the predominance of Owen Buckets seen in operation everywhere on large and small construction projects.

Write for the Owen Catalog and complete information on the line which includes an ideal bucket for every digging, handling or rehandling job.



BUCKETS AND GRAPPLES
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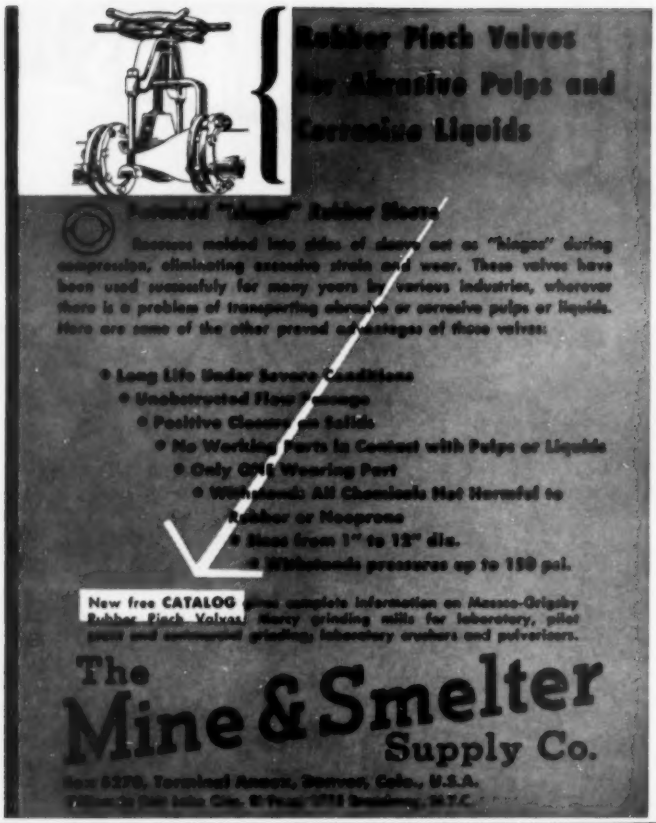
THE OWEN BUCKET CO.
5040 Breakwater Avenue • Cleveland, Ohio
Offices: New York, Philadelphia, Chicago, Berkeley, Calif., Fort Lauderdale, Fla.


Rubber Pinch Valves
for Abrasive Pulps and
Corrosive Liquids
Patented "Hinged" Rubber Sleeve
Sleeves molded into plies of sleeve act as "hinges" during compression, eliminating excessive strain and wear. These valves have been used successfully for many years by various industries, wherever there is a problem of transporting abrasive or corrosive pulps or liquids. Here are some of the other proved advantages of these valves:
• Long Life Under Severe Conditions
• Unobstructed Flow Passage
• Positive Closure on Solids
• No Working Parts in Contact with Pulps or Liquids
• Only ONE Wearing Part
• Withstands All Chemicals Not Harmful to Rubber or Neoprene
• Sizes from 1" to 12" dia.
• Withstands pressures up to 150 psi.
New free CATALOG gives complete information on Massco-Grigsby Rubber Pinch Valves, Marcy grinding mills for laboratory, pilot plant and commercial grinding, laboratory crushers and pulverizers.
The Mine & Smelter Supply Co.

EVERYTHING is contained INSIDE the pulley shell!

HERE'S a money-saving departure from conventional conveyor drives. A Cedarapids-Schrock *Motorized* Head Pulley is simply a new application of the long-proven gear reduction drive, with everything . . . electric motor, reduction gears and all moving parts . . . contained inside the drum, completely protected from grit, dirt and weather and with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime is saved by eliminating the exposed parts necessary with conventional pulley drives. In operation, the pulley shell rotates about the electric motor which is held stationary by a torque arm attached to the conveyor frame. The speed of the shell depends on the combined reduction ratio of the pinions and gears inside the shell. Compact, easy-to-install, job-proved Motorized Head Pulleys are available in sizes from 5 to 30 HP and in various widths.

Find out all the advantages of converting your belt conveyor or belt-bucket elevator installations to *motorized* efficiency before you need head pulley replacements. See your distributor today, or write for Bulletin MP-1.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

Built for sale in Arizona, California, Nevada, New Mexico, Southern Oregon, Southwestern Utah and Texas by
YUBA MANUFACTURING CO.
(Pulley and Sprocket Department)
Benicia, Calif.

American river will be 1400 ft. long; the over-all length of the dam will be 23,000 ft. Some 15,500,000 cu. yd. of excavation is projected. The dam will have 1,000,000 acre-ft. of storage capacity, of which 400,000 acre-ft. will be for flood control purposes. The dam will have a maximum height of 370 ft. The concrete section across the river is of the straight gravity type.

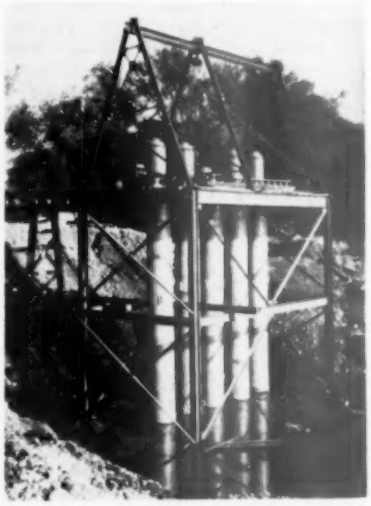
The power plant that is being built under the direction of the Bureau of Reclamation will have three penstocks serving three generators of 54,000 kw. each. The three Francis-type turbines have a rated capacity of 74,000 hp. each and will operate at a 300-ft. head. Nimbus dam, a part of the afterbay facilities, is seven miles downstream and will include equipment to produce an additional 15,000 kw. of electrical energy.

Nimbus dam is being built by Winston-Johnson. Aggregates for this job are purchased from the Fair Oaks plant of Pacific Coast Aggregates and are trucked to the job by the contractor. The haul is about five miles. Near the damsite, the contractor has erected a batching plant with two mixers and Blaw-Knox weigh batchers. The yardage of concrete in Nimbus dam is relatively small.

Nimbus dam is using portland cement from Permanente Cement Co. Cement for the power house at Folsom and the dam proper is from Calaveras Cement Co., San Andreas, Calif. Type II modified portland cement is used for the mass concrete. Nimbus dam is using a slightly richer mix than at Folsom but no additives are used at either other than air-entraining agents. Specifications permit the use of Vinsol Resin, Darex, Pozzolith and Du Pont's airentraining agents.

Personnel

Corps of Engineers work at Folsom dam is directed from the Sacramento, Calif., district office; Col. C. C. Haug



Five 10-in., 5-stage deep well pumps supply 5000 g.p.m. at 90 p.s.i. for aggregate plant

is district engineer. In charge of the work at the damsite is Robert B. Jenkinson, project engineer, assisted by Irwin E. Burk. S. D. Burk is concrete technologist. John de Arrieta is office engineer and John Eoff is assistant office engineer. William Clark is in charge of earth fill construction.

The portion of the work under the Bureau of Reclamation is supervised by H. F. Bahmeier, construction engineer, with R. A. Young the field engineer. J. D. Seery is assistant construction engineer.

Contractor's representatives are D. E. Stinson project manager, and L. G. Sumner, project engineer. J. R. Blinn is head office engineer. Chick Alexander is in charge of the aggregate production.

Rotary Kiln Research

(Continued from page 108)

calorimeter. The heat absorbed by the raw mix through all the burning stages in the kiln, both dry and wet processes, is about 39 percent of the total heat absorbed through each type kiln, and the remaining heats are fixed in clinker as latent energy.

Conclusion

The author attempted to investigate the cement rotary kiln from many angles such as the chemical, physical, microscopical, and x-ray. Suggestions for the planning and handling of the cement rotary kiln resulting from this research follow.

1. Heats governing every burning stage of the cement rotary kiln were obtained by investigating heat loss from the kiln shell, quantitative measurement of the flow of raw mix, and measurement of heat of solution and heat of hydration of the raw mix at every stage through the kiln.

Table VI. Comparison of dry and wet kilns

	Ratio Dry	Wet	Remarks
Coal required for burning	100	144.5	34 percent water content in slurry
	100	112.6	20 percent water content in cake
Compressive strength of cement (4 week)	100	130	
Capacity of kiln kg/m. (inside vol.)	41.35	31.0	no filter
	41.35	43.4	20 percent water content in cake

2. The efficiency of heat absorption into a unit quantity of raw mix per meter run through the kiln of the wet process is much better than that of the dry process, as a rule; even with 20 percent water content in the cake, the wet process exceeds the dry process in its productive capacity as shown in Table VI. If the water content in the slurry cake could be reduced to 14 percent, the wet process would completely surpass the dry process in all respects.

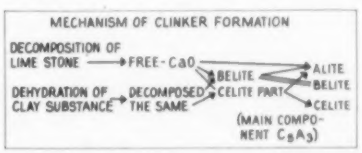
3. We can easily get an excellent cement with very quick burning by the wet process. The characteristics of the wet process such as the finer raw mix and granular size of slurry cake permit very good heat penetration, and especially rapid exothermic reaction in the clinkering zone.

4. As the heat loss from the shell in the clinkering zone and from the cooler shell, especially in reflex type, is comparatively large, it is advisable to minimize the loss by utilizing this heat to preheat the primary air.

5. The raw mix composition gradually changes and also its modulus of H.M. S.M. and I.M. decrease during burning, owing to coal ash and escaping dust. Coal ash mainly settles down at the boundary of the calcining and clinkering zones both in dry and wet process kilns, but the influence of coal ash is more serious in the wet process.

6. The author believes no man has ever investigated the raw mix in the rotary kiln by means of X-ray and microscope before him. Of course, small components in it cannot be detected by x-ray, but the general aspects of the clinker burning, especially the change of free CaO→belite→alite systems were observed, which is in line with microscopic and chemical investigations.

7. Microscopic observation including quantitative measurement of clinker minerals in its visual field is more effective than x-ray analysis. By this observation the development of alite in the kiln continued after free lime disappeared. Free lime required for alite formation is believed to be supplied thereafter by the decomposition of C_3A previously produced.



8. Limestone is apt to become finer through calcining than is the clay; quartz grains especially remain without crumbling. So it is advisable to grind the clay as fine as possible.

The quantity of heat of formation of the burned raw material is not always proportional to the strength of the cement prepared from them.

From this point of view, sudden cooling of the clinker must be restricted to a range below about 1170 deg. C., considering transition of C_3S at 685 deg. C. and easy grindability of clinker in quenching.

Satisfactory development of alite requires a very slow annealing from 1450-1170 deg. C. With this treatment, an excellent cement of high alite type (Japanese patent No. 149,659, assigned to the author) is easily obtained.

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4. T. Yoshii, *J. Soc. Chem. Ind. Japan*, 43, 594-600, 967-70, (1940) ibid. 44, 22-6 (1941)

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1 **ALLOY PRODUCTS**—Stroh Process Steel Co. has released a 10-page catalog on its alloy products for the cement and allied industries. Included in the catalog are data pages on gears, gears and pinions, bevel gears, two segment tires and trunnion rollers; also a page of data on the use of Stroh 20° involute long and short addendum teeth gearing.

2 ARC WELDERS—General Electric Co. has announced Bulletin GEC-917 which describes its 200-ampere, engine-driven d-c arc welder with a 60 percent duty cycle. The bulletin gives current range, design features and claimed construction advantages.

3 **BEARINGS**—The Gwilliam Co. has released Catalog No. 28 which describes its line of ball thrust bearings, roller thrust bearings, and special bearings. The various types are illustrated and standard sizes are listed in tabular form.

4 **BELT FASTENERS**—Flexible Steel Lacing Co. has announced Bulletin F-106 on its line of belt fasteners and rip plates with assembled bottom plates. The parts are illustrated and a chart of size, weight and list price is included.

5 BITUMINOUS PAVER — Pioneer Engineering Works, Inc., has published Form No. 633 on its Model BP-6 bituminous paver. It explains operating details and includes complete specifications.

6 **CLAY CRUSHERS**—Eagle Iron Works has released Bulletin No. 952 which gives construction details of its double roll clay crushers. Two new models are illustrated and described. Cross sectional drawings, specification charts and action photographs are included.

7 **CLUTCHES — Link-Belt Co. has announced folder No. 2437 describing Link-Belt Beyl friction clutches and couplings. Schematic drawings and dimensional tables are included.**

8 CONCRETE FORMING TABLES—Symons Clamp & Manufacturing Co. has announced a 4-page folder of tables compiled to serve as an aid in the erection of form work for slabs, columns and beams. Detailed spacing information is included.

9 **CONTROL VALVES**—Minneapolis-Honeywell Regulator Co., Brown Instruments Div., has published Bulletin 8503 which describes butterfly valves for regulating the flow of air, gas, liquids or steam in conjunction with indicating, recording or non-indicating pneumatic controllers. The bulletin contains application data, specifications, dimensions and sizing data.

10 DIESEL ENGINES—Caterpillar Tractor Co. has released Form 30338, entitled "Attachments for Your Caterpillar Diesel Engine." It contains a list of the attachments; these are pictured and described to show what they do.

11 **DUST DISPOSAL**—Research Corp. has released a 6-page bulletin with illustrated information on the recently developed M.I. (magnetic impulse) continuous electrode rapping system for electrostatic precipitators. Operation of this system is explained with circuit diagrams and photographs of major components. The bulletin also contains a summary of M.I. rapper features.

12 **ELECTRIC GENERATORS**—Caterpillar Tractor Co. has issued Form 30249, entitled "Generating Power and Profits." A size chart is given and operation and fuel consumption are described.

13 **ENGINES—Westinghouse Electric Corp. presents a report of the significant engineering achievements of the company during 1952 in its illustrated booklet "Westinghouse Engineering Highlights", reprinted from January, 1953, issue of Westinghouse ENGINEER.**

14 FLOTATION — Denver Equipment Co. has announced Bulletin F10-B69 describing its Sub-A Super Rougher flotation machine. Construction details are given and installation photos are included.

15 **HAMMERMILL**—Miller Equipment Co. has released a bulletin describing its double rotor hammermill. Three cross sectional views point up construction features. Installation and construction information is given. A detailed specification chart is also included.

16 **HARD SURFACING — Rankin Manufacturing Co. has published a "Hardsurfacing Comparison Chart" for Ranite hard surfacing welding materials giving the approximate melting points and relative comparison of Rockwell, Scleroscope and Brinell hardness tables.**

17 HOSE COUPLINGS — Hose Accessories Co. has published an 8-page bulletin which describes six types of Le-Hi Quick-Lock hose couplings and fittings and where they are used.

18 **INSTRUMENTATION**—Fisher Scientific Co. has just released Vol. 22, No. 2 of "The Laboratory." Automobile research, new instruments, description of the U. S. Public Health Service and new methods and fields of research are discussed and illustrated.

19 JAW CRUSHERS — Smith Engineering Works has published Bulletin No. 280, featuring Telsmith jaw crushers in sizes ranging from 10 x 16 in. to 30 x 40 in., for use in quarries, gravel plants, construction and mining fields. Also included are sectional views, typical applications, specifications and general dimension tables.

20 LUBRICATION—Euclid Road Machinery Co. has published a lubrication booklet giving the "whys and wherefores" of lubrication. It details procedures for the manufacturer's equipment, discusses fundamentals of lubrication, characteristics of lubricants, and their properties and tests. Reasons for oil and lubricant changes, proper lubrication intervals and recommended procedures are also included.

21 MULTIWALL BAGS — International Paper Co., Bagpak Division, has published Brochure No. B53, giving information on its line of multiwall bags. The five basic types are illustrated and a brief discussion of the construction and available methods of filling and closing accompany each illustration. Bag kraft paper, bag printing, palletizing and bundling, and various types of bag-filling and closing machines are also described.

22 PLASTER FIRE PROTECTION—Vermiculite Institute has released a two-page bulletin summarizing the fire ratings for wood joist floors and wood stud partitions protected with vermiculite plaster on gypsum lath and metal lath, and gives the comparable fire resistance obtainable with sand plaster in each instance. The specifications for vermiculite plastering over gypsum lath and metal lath are also given.

23 PRESTRESSED CONCRETE—Stressteel Corp. has published a handbook, Stressteel Manual, describing its high strength steel tensioning units for the prestressing of concrete. Advantages, applications, design data, materials, specifications, construction procedures and order requirements are given.

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24 PRODUCTION—Caterpillar Tractor Co. has published a 14-page brochure called "Producers of Wealth," dealing with the company's growth during the years 1930-1950. Sections are devoted to its growth in sales and net assets; its management, its financial position and its outlook for continued extension of its sales and production facilities.

25 PROTECTIVE COATINGS — Magic Chemical Co. has published its revised catalog on Magic-Vulc anti-abrasion and anti-corrosion plastic rubber coatings. A complete list of the various coatings and their uses is contained in the catalog. Detailed instructions of use are included.

26 PUMPS—Nagle Pumps, Inc., has released Bulletin 952 which contains descriptions and suggested applications for nine different centrifugal pumps for abusive industrial applications. Detailed diagrams of the pumps are included.

27 SCREEN HEATERS—F. R. Hannon & Sons has issued a bulletin on its Hanco electric screen heaters. The claimed advantages are described, illustrations of the screen on the job are given and two examples of quick-change attachments are shown.

28 SERVICE JACK—Rodgers Hydraulic Inc., has issued Catalog No. 321 on its portable tractor service jack. Detailed construction diagrams and operating instructions for repair procedure for maintenance work on all makes and models of crawler tractors are given. A specification sheet is included and accessory equipment is listed and discussed.

29 SHOVEL-CRANES — Link-Belt Speeder Corp. has published an illustrated Catalog No. 2428 covering its line of ½-cu. yd. shovel-cranes including crawler-mounted LS-51, truck-mounted HC-51 and wheel-mounted MS-51. Catalog includes features and advantages of "Speed-o-Matic" controls, and power-driven hydraulic control system.

30 SILICONES—General Electric Co. has released a bulletin describing the basic properties and uses of silicone. Product and application charts are also given.

31 SYNTHETIC LUBRICANTS — Carbide and Carbon Chemicals Co., Div. of Union Carbide and Carbon Corp., has released several bulletins discussing its "Ucon" synthetic lubricants. Typical properties of representative synthetic lubricants are listed, and industrial experiences with them are described. Instructions for their use in internal combustion engines are given. Advantages, applications and test results are included.

32 TEMPERATURE RECORDER — The Foxboro Co. has issued bulletin 447 which contains details of temperature recorder construction and information for selection and use of temperature measuring instruments. Actual installations are pictured, design features checked, thermal systems charted and complete descriptions provided for rectangular and circular case instruments, temperature bulbs, charts and accessories.

33 TRANSMISSIONS — Fuller Manufacturing Co. has published the 50th anniversary issue of "Transmission Topics" which tells of half a century of development and growth in the field of power transmission. The booklet tells of the company's industrial progress in making equipment for the logging, construction, mining, oil drilling, material handling and other heavy equipment fields.

34 TRUCK SHOVELS—"Quick-Way" Truck Shovel Co. has published a booklet on its line of truck shovels and attachments. Through illustrations, it shows the actual part by part assembly of the unit, and various action shots show the jobs that can be handled with one attachment. Engineering data on mechanical features and construction, together with complete specifications and charts on digging ranges of the four models are covered in the bulletin.

35 TRUCKS—Euclid Road Machinery Co. has released a catalog sheet covering models 1FFD and 4FFD rear-dump trucks of 34-ton capacity. The catalog sheet gives detailed specification data.

36 TUBING—Flexible Tubing Corp. has issued catalog C2-4 describing its flexible tubing for ventilation, fume and dust removal, and materials handling. Two new types of tubing are described. The bulletin contains detailed specifications, air friction charts, data on oil and chemical resistance, and application information.

37 V-BELT CONVEYOR—Richardson Scale Co. has announced Bulletin No. 0152 on its V-belt conveyor for transporting paper, cloth, or burlap bags from filling and weighing equipment through bag-closing operations. Bulletin covers operating details, capacities, and special features of the conveyor.

38 VERTICAL PUMPS — Allis-Chalmers Manufacturing Co. has released Bulletin 52B-6975A describing its small vertical pumps for sidewall or submerged mounting. Curves and tables to determine motor frame, horsepower, speed and current characteristics for the various units are included. Construction details of shaft seals and motors are also given.

39 VIBRATING SCREENS—Universal Vibrating Screen Co. has released Bulletin No. 125 on its latest models of vibrating screens. Specification charts are included.

40 WATER SUCTION HOSE—B. F. Goodrich Co. has published Catalog 4600 on its water suction hose. The catalog describes four types of hose. A table lists types of fittings and their recommended uses. The catalog also lists specifications, describes materials and methods used in construction of the hose and gives recommended uses.

41 WELDERS — Wall-Colmonoy Corp. announces a 4-page illustrated bulletin describing the Colmonoy Spraywelder and Sprayweld process. Latest developments in equipment and techniques to provide non-porous, wear, heat, erosion and corrosion-resistant surfaces are included, also typical applications in the cement, stone, chemical, construction and mining industries.

42 WELDING—Hobart Brothers Co. has released Vol. IX, No. 4, of Hobart Arc Welding News. A featured article is "Conveyors by Expert Craftsmen," which stresses unusual conveyors and the use of welding in constructing them. Colored illustrations of the various models of welders are included.

43 WIRE ROPE—A. Leschen & Sons Rope Co. has published a 64-page "Wire Rope Handbook", R-51, which includes descriptions, diagrams and illustrations of wire rope types and constructions, plus information about lubricants, working loads, safety factors and specifications. Forty charts give breaking strengths and weights of wire rope by constructions and sizes, along with calculations for the proper selection of wire rope attachments.

44 WIRE ROPE—Union Wire Rope Corp. has released a booklet which gives detailed step-by-step procedure for splicing an eye into the end of a wire rope. Each step is illustrated.

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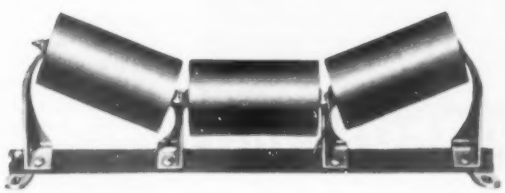

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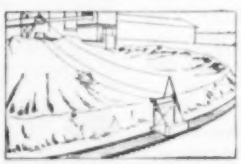
Sauerman Scraper Excavator Digs Gravel from Hill.



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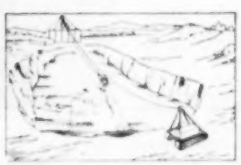

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Labor Relations Trends

(Continued from page 59)

graph (A) of this section now reads: "(A) forcing or requiring any employer or self-employed person to join any labor or employer organization or any employer or other person to cease using, selling, handling, transporting or otherwise dealing in the products of any other producer, processor or manufacturer, or to cease doing business with any other person;". That, of course, is the crux of the secondary boycott as it affects our construction industry. The "Provided," and what follows above, is tacked on the end of this paragraph to soften its terms. The comments about this change say that it merely applies to goods moved from a struck plant to another for order filling, but the terms of the amendment seem broad enough to cover some obvious abuses of the secondary boycott.

Section 8 (a) (3) would be amended by striking out everything after "(B)" and inserting the following: "If he has reasonable grounds for believing that membership was denied or terminated for reasons other than (1) the failure of the employe to tender the periodic dues and the initiation fees uniformly required as a condition of acquiring or retaining membership, or (2) the employe's membership or affiliation with the Communist Party or his support thereof, or his membership in, affiliation with, or support of any organization that believes in, or teaches, the overthrow of the United States Government by force or any illegal or unconstitutional methods;".

The part that is striken out reads: "(B) if he has reasonable grounds for believing that membership was denied or terminated for reasons other than failure of the employe to tender periodic dues and initiation fees uniformly required as a condition of acquiring or retaining membership." This extends the power of the union to drop a member who may be accused of communist sympathies. However, there is no denying that such power could be greatly abused by the union to get rid of anyone it did not like.

Section 8 (b) (2) now reads: "(2) to cause or attempt to cause an employer to discriminate against an employe in violation of subsection (a) (3) or to discriminate against an employe with respect to whom membership in such organization has been denied or terminated on some ground other than his failure to tender periodic dues and the initiation fees uniformly required as a condition of acquiring or retaining membership." The proposed amendment would add: "or his membership or affiliation with the Communist Party, or his support of any organization that believes in or teaches the overthrow of the United States Government by force or any illegal or unconstitutional methods."

Section 9 (f) (6) would be striken

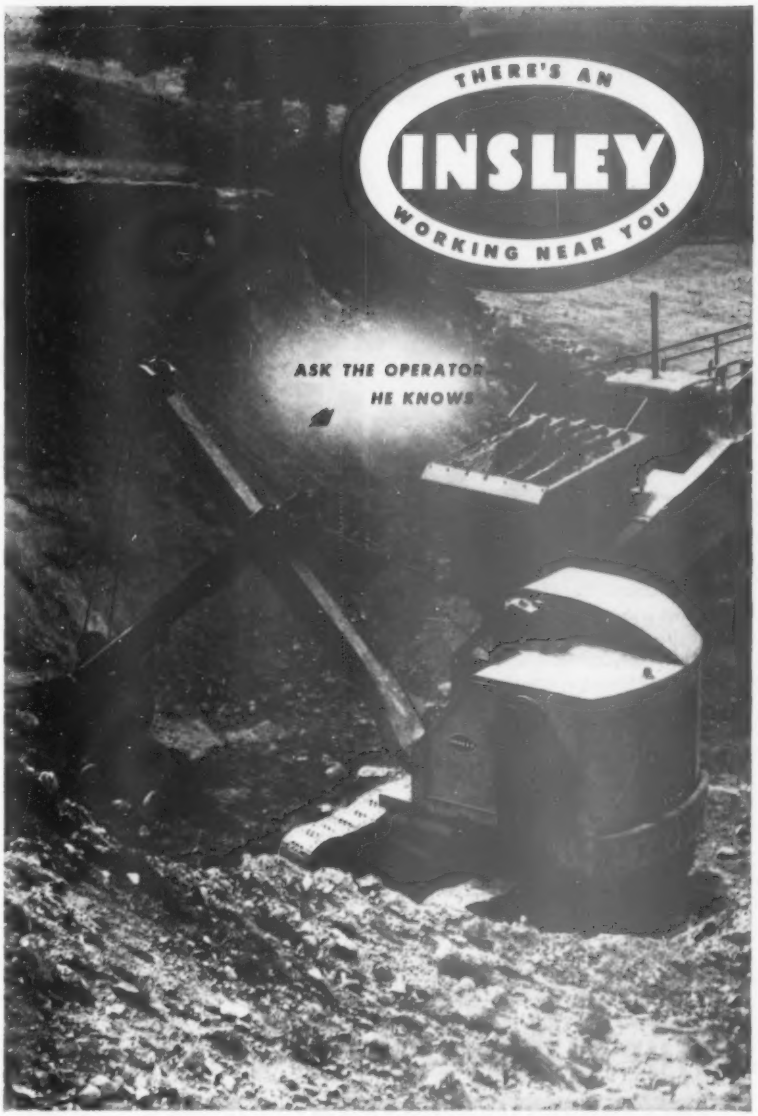
out under the proposed amendment. This section refers to the qualifications of a labor organization to justify investigation by the N.L.R.B. and requires the filing by the union of its constitutional provisions and regulations regarding membership qualifications, how it authorizes strikes, disburses union funds, etc. The matter of dues and assessments is covered in other parts of the same section, but it is not clear why the other requirements should be eliminated.

Construction Industry

The construction industry labor has always fought the requirements for an election prior to a union-shop agreement. In fact it is an open secret that the industry is reported to have continued its closed-shop agreements in plain violation of the law. Bill S.656 would amend this part of the Act as follows:

"(a) At the end of section 9 (a) insert the following: '*Provided further*, That nothing in this section or any other section of this Act or of any other statute or law of the United States shall preclude an employer primarily engaged in the building and construction industry from making an agreeemnt covering employes engaged (or who, upon their employment, will be engaged) in the construction, alteration, or repair of buildings, or other structures and improvements, on which building and construction trade workmen are employed, with a labor organization (not established, maintained, or assisted by any action defined in section 8 (a) of this Act as an unfair labor practice, and which at the time the agreement was executed or within the preceding twelve months has received from the Board a notice that it has complied with all the requirements imposed by section 9 (f) (g) (h) to require, as a condition of employment, membership in such organization on or after the seventh day following the beginning of such employment, and no such agreement shall be considered an unfair labor practice under section 8 of this Act, solely because no election has been held under the provisions of section 9 of this Act prior to the making of such agreement: *Provided further*, That nothing herein shall set aside the final proviso to section 8 (a) (3) of this Act."

Section 9 (a) is the one covering the election of representatives for collective bargaining. The purpose of this is to authorize union-shop contracts without the usual formality and to give the employes covered only seven instead of 30 days to join up. The final proviso to Section 8 (a) (3) has to do with employer discrimination in the case of a worker denied membership in a union for reasons other than non-payment of dues, etc. (This part of the Act, as already stated, would be amended to include communist sympathies as a legitimate



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reason for rejecting a proposed member.)

Most of the other proposed amendments have to do with the organization of the N.L.R.B. and an increase in its membership from five to seven, and to procedures of the Board. The only other proposed amendment of general interest refers to extension of further rights of employers to address their employes about the virtues or the opposite of union membership, provided their remarks contain no threats or promises. Under the present law the "free speech" provision applies only to controversies involving unfair labor practices. The amendment would give management an opportunity to use its arguments more freely.

We agree with an editorial in the *Wall Street Journal* of February 2, 1953, which says that all this legislation has been considered too much from the angles of what is "fair to labor" and what is "fair to management", with too little consideration of what is fair to the public. It says the problem is the problem of the present monopoly of labor. To quote:

"So the problem will never be solved, the public will never cease to be a victim, until a law is written in terms of the public interest against this monopoly as against any other.

"There are difficulties in drafting a precise law. But there were the same difficulties 60 years ago when we passed our first anti-trust laws against the monopolies of that day. The years of redrafting, of court interpretation, of dealing with specific cases, have not solved all the difficulties of getting a precise law. Yet those difficulties have not proved insuperable and the net effect of the law has been great and good. The difficulties here for lawmakers and the courts would be no greater.

"There are also political difficulties. It will be charged that any such law will 'destroy the unions.' It is self-evident that it will destroy some of the power of union leaders, but it will not destroy the unions any more than the Sherman Law destroyed business."

Rocky's Notes

(Continued from page 57)

a slower acting combination and look around for accelerators, when they are needed, than the reverse process. For example, pulverized blast-furnace slag, given time and moisture, will set as "hard as the hinges of Hell." There must be somewhere in between slag and portland cement clinker just the right combination. Of course, the use of calcium chloride is an example of the use of an accelerator, but here again we start with a product that under ordinary conditions needs no accelerator. Anyhow, one does not leave out the gypsum when using calcium chloride, even though the logical approach would be to leave it out and use less accelerator, since some of each is used to offset the action of the other.

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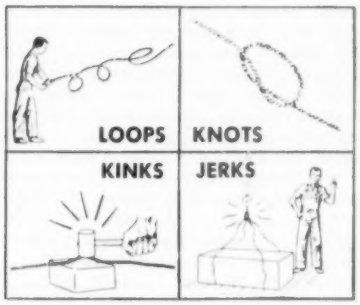
PREVENTS DAMAGE!

When These Stresses Happen To Slings



Only Tuffy gives you the 9 part machine-braided wire fabric construction that fights off knots and kinks . . . stands up longer if such stresses occur. These extra Tuffy advantages assure longer sling service that can help you save up to 40% on sling costs!

Free 3' Sling Sample!

Knot it—kink it if you can—put it to the test. See how easily Tuffy straightens out—without damage!

Free Sling Handbook!

New! Complete! Only handbook of its kind. Factual, useful data, graphically illustrated to help you cut sling costs.

Get Your FREE Sling Handbook

Contains plenty of factual, useful data on 12 braided sling types. The only handbook of its kind, and it's yours for the asking!

MAIL COUPON TODAY

UNION WIRE ROPE CORP.
Specialists in Wire Rope and Braided Wire Fabric
2156 Manchester Ave., Kansas City 3, Mo.

☐ Send FREE Tuffy Sling Handbook and Rigger's Manual.
☐ Have my Union Wire Rope Fieldman bring my free sample of Tuffy Sling.

*Firm Name*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

C-5

Crushing Practice

(Continued from page 117)

also be known, but this information is not absolutely essential in making the comparison. Taking half the top diameter of the head as a radius, draw the circle which represents the top of the head; then, increasing the radius by the actual opening between head and concaves at their tops, draw the circle representing the concave ring at the top of the crushing chamber. Then superimpose the diagram of the jaw crusher opening, laying it in tangent to the head circle.

To facilitate this work for the line of Superior McCully gyratory crushers, we list in the following table the top diameters of the heads, and openings between head and concaves for straight-face, and non-choking, concaves.

Effective Gyratory Crusher Openings

Crusher Dimensions		Opening at top of concaves	
Size	Head diameter at top	Straight conc.	N-C conc.
16 in.	21⅝ in.	16 in.	13½ in.
20 in.	23¼ in.	20¾ in.	16½ in.
30 in.	29 in.	30½ in.	25 in.
36 in.	34 in.	36¼ in.	32 in.
42 in.	34 in.	42¼ in.	38 in.
50 in.	44 in.	50¼ in.	
54 in.	42 in.	54 in.	
60 in.	43½ in.	60 in.	

Laying in the plan view of the spider hub and arms will, of course, give a more complete picture of the gyratory crusher receiving openings, but the picture is likely to be a little misleading unless it is borne in mind that the maximum diameter of the spider hub is some distance above the upper rim of the crushing chamber, and therefore does not restrict the receiving opening as much as the plan view indicates. The true effective receiving opening can only be shown in its proper proportions by tilting the plan view; that is, by an angular projection normal to a plane which is tangent to the bulge of the spider hub, and to the top of the crushing head. To draw such a view requires more information—and usually more drafting skill—than the average man has at his disposal. The circle method described in the second preceding paragraph is sufficiently close for all practical purposes.

Handling Slabby Material

If the material to be crushed is of a slabby nature—as, for example, a thinly stratified limestone or shale—the product of the jaw crusher is certain to contain slabs, some of which may be quite large, particularly so if some of the strata in the deposit are thinner than the discharge setting of the crusher. Nor is this tendency to slab in the crusher confined to stone of stratified formation. Some rocks of massive formation may contain parallel cleavage planes in certain sections of the deposit. Such material will slab in the crusher just the same as those rocks which were

(Continued on page 138)

Tuffy®

Better 6 Ways On SCRAPERS

"The Best Scraper Rope I've Ever Had"

Says a Midwestern Scraper Operator
(Name on Request)

This Missouri scraper operator has learned that Tuffy Scraper Rope pays off in longer runs . . . and the owner of the company he works for knows that Tuffy pays off in lower costs! Tuffy is *specially made* for use on wheeled scrapers. It's tailored to take:

- **Greater Drum Crushing Abuse**
- **Sharper Bends Over Small Sheaves**
- **Angle Pulls Through Swiveled Sheaves**
- **Crawling on Guide Roll Flanges**
- **Heavy Line Pull . . . Rapid Line Speed**
- **Multiplied Shock of Load on Slack Line**

Tuffy Scraper Rope is ready to mount on your reel spindles. Just remember the name Tuffy, the diameter and the length. That's all you need to know to order *Tuffy!*

Send for FREE Folder on Tuffy Scraper Rope

MAIL COUPON TODAY

UNION WIRE ROPE CORP.
Specialists in Wire Rope and Braided Wire Fabric
2156 Manchester Ave., Kansas City 3, Mo.

Please send the FREE illustrated folder on Tuffy Scraper Rope.

*Firm Name*_____
*By*_____ *Title*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

C-4

Macwhyte 6x25F PREformed Monarch Whyte Strand Wire Rope with I.W.R.C.

How many moving parts?

In this particular rope construction, there are 199 individual wires. Each is a carefully designed "moving part."

To assure highest quality, all stages of wire manufacture and rope fabrication are closely controlled. Each wire is protected with a film of lubricant that is force-fed cold during the fabricating. May our engineers recommend the right rope for *your* equipment?

GET THE RIGHT ROPE FOR YOUR QUARRY EQUIPMENT

MACWHYTE WIRE ROPE

Ask for G-15 Handbook

MACWHYTE COMPANY
2949 Fourteenth Avenue, Kenosha, Wis.
Mill depots: New York • Pittsburgh
Chicago • St. Paul • Fort Worth
Portland • Seattle • Los Angeles
Distributors throughout U.S.A.

formed in definite layers, or beds.

The gyratory crusher by virtue of its annular discharge opening is an effective slab breaker. This faculty, coupled with the fact that its receiving openings are especially well suited for admitting slabby feed, give it a very definite advantage over the jaw crusher in the handling of such material.

In the foregoing comparison of these two leading types of primary breakers we have endeavored to present the case for each of them in a fair and impartial manner. It would be difficult, and probably more than a little tedious for the reader, if we were to attempt a more definitive analysis or to set up fixed rules of procedure for selecting one or the other machine—a process which is always fraught with pitfalls in such a broad and empirical branch of engineering as the processing of rocks and ores. Usually the matter of choice can quickly be narrowed down to a comparison of one size in each type. These two machines may then be tabulated with respect to capital investment, capacity, power requirements, space requirements, and so forth; their receiving openings may be compared, as we have suggested, and all of the factors we have discussed in this section checked against the features and limitations of each machine to determine its ability, or inability, to fit into the plan.

(To be continued)

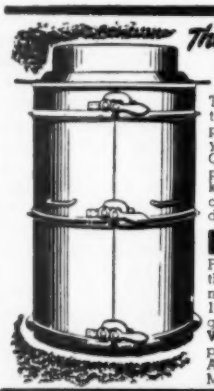
SIMPLICITY
WOVEN WIRE SCREENS

- ACCURATE
- DEPENDABLE
- AVAILABLE

Simplicity maintains big stocks of aggregate wire screens, already woven, in an adequate range of openings and a choice of wire gauges . . . edges formed promptly for any type vibrator. Excellent service.

Write for Bulletin No. 66

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY • DURAND, MICHIGAN



The "Quinn Standard" FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that **Quinn pipe forms** and **Quinn mixing formulas** combine to produce the finest concrete pipe at lowest cost.

QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost. **WRITE TODAY.** Complete information, prices, and estimates sent on request. Also manufacturers QUINN CONCRETE PIPE MACHINES.

QUINN WIRE & IRON WORKS 1603 12TH ST. BOONE, IOWA

Slurries... *handled at lower cost*

The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

A. R. WILFLEY & SONS, Inc.
Denver, Colo., U.S.A.
New York Office: 1775 Broadway, N.Y.C.

Buy WILFLEY for Cost-Saving Performance

WILFLEY centrifugal PUMPS

NEW INCORPORATIONS

Airlite Processing Corp. of Florida, Vero Beach, Fla., was recently incorporated with 500 shares of stock, $100 par value, for the production of lightweight aggregates from perlite ore. The incorporators are David Funk, Lester L. Dittman, Lloyd M. Everitt, Fred L. Everitt and Thomas B. Everitt.

Two Rivers Sand and Gravel Co., Hermann, Mo., has been incorporated. The firm is capitalized with 500 shares of common stock having a par value of $12,500. Herman Schaefer and Herbert Williams hold 225 shares of stock and Walter Schaefer, 50 shares.

The Vandalia Sand and Gravel Co., Inc., Tipp City, Ohio, has been incorporated with 250 shares of stock. Capitalization was listed as $25,000. The incorporators are Jay E. Martin, Jairus S. C. Chase and James A. Steinberger.

Good Hope Sand & Gravel Co., Inc., Milwaukee, Wis., was recently incorporated with 100 shares of stock, no par value. Minimum capital was listed at $500. The incorporator is Gladys McFee. Resident agent is Howard Stark.

Neelley Ready Mix Concrete, Inc., Waco, Texas, has been granted a 50-year corporation charter. Capital stock was listed at $50,000. The incorporators are Edwin D. Neelley, Stanley C. Morris and Dorothy Morris.

Federal Pipe, Inc., Glens Falls, N.Y., has been incorporated with 500 shares of stock, no par value, for the production of concrete pipe and building supplies. The directors are Frank Federici, Vincent Federici and Charles E. Hendricks.

Bryant Limestone, Inc., Olympia, Wash., has been incorporated with a capitalization of $50,000. The incorporators are Gladys and Walter Sykes, James Aikins, and Max and Peggy Pokorney.

Mission Valley Sand, Inc., Leavenworth, Kan., has been incorporated with a capitalization of $20,000, to dredge for sand and to deal in other building materials. Resident agent is F. C. Banon.

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L. J. L. Sand & Supply Corp., Milwaukee, Wis., has been incorporated with 100 shares of no par value stock and a minimum capital of $500. The incorporators are George C. Lord, Don E. Jessup and Leonard Loveless.

MANUFACTURERS OF CRUSHING EQUIPMENT SINCE 1885

Heart of this Mobile Plant
is the well known
GRUENDLER HAMMERMILL
widely accepted throughout the years as "THE" AG-STONE MILL!

The Gruendler Mobile 2-in-1 complete Crushing & Screening Plant

Here shown is the Gruendler Model 75 at work for The Bailey Limestone Co., Kirksville, Mo. Designed for 30 T.P.H. on AG-LIME and 100 T.P.H. on AGGREGATES.

Features:

GRUENDLER 3XD 2-in-1 HAMMERMILL

Ample CONVEYOR and SCREEN CAPACITY plus trouble free Drives have made it possible to almost double the rated capacity of the plant.

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CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

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KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

Macwhyte 6x25F PREformed Monarch Whyte Strand Wire Rope with I.W.R.C.

How many moving parts?

In this particular rope construction, there are 199 individual wires. Each is a carefully designed "moving part."

To assure highest quality, all stages of wire manufacture and rope fabrication are closely controlled. Each wire is protected with a film of lubricant that is force-fed cold during the fabricating. May our engineers recommend the right rope for *your* equipment?

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(To be continued)

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- DEPENDABLE
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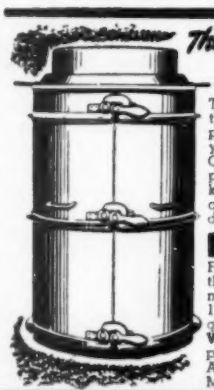

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WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
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New York, N. Y.

JUNK?... No More

Crusher Plates Rebuilt with MANGATONE N. M. last twice as long...

Just take a look at a typical assortment of crusher plates to be REBUILT.

It was only a few years ago that such a practice was regarded as "impossible" . . . "impractical" . . . "not economical".

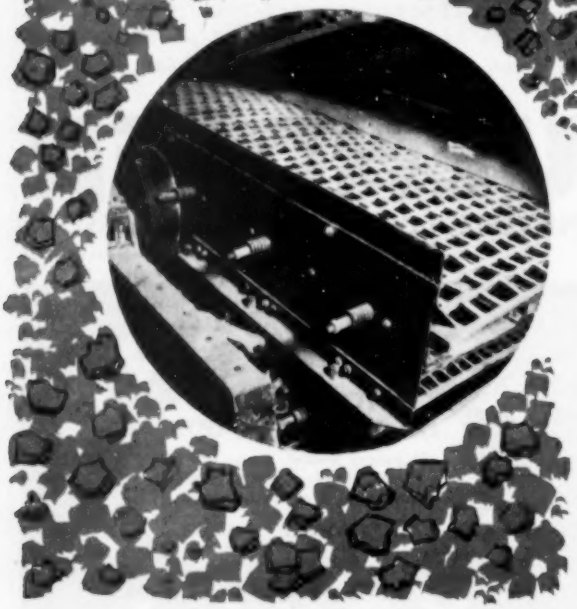
All that sort of thing is gone today. Your Resisto-Loy dealer can take care of this problem in the same efficient manner in which he handles any other problem of WEAR-PREVENTION for you.

It's real economy to have your Crusher Plates rebuilt the Two-Tone way. What's more, they will LAST LONGER THAN A NEW PLATE.

Call in our field man and let him work out this and your other problems of wear prevention.

RESISTO-LOY CO. *Manufacturers* **Grand Rapids 7, Michigan**

Not a clog in a carload . . .



That's right . . . the full clearance of Hendrick Perforated Metal assures the screening of large quantities of materials without time-wasting blinding. Hendrick Perforated metal maintains uniformity of mesh through a sustained life of service. Decks can be changed rapidly saving valuable time and effort. Supplied either flat or corrugated, Hendrick Perforated Metal is available in any desired shape and size of openings in high carbon, stainless steels and in other commercially rolled metals.

Write for more complete information — or phone Hendrick direct!

Hendrick

MANUFACTURING COMPANY

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Sales Offices in Principal Cities

SEE OUR CATALOG IN SWEET'S

Perforated Metals • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Crowded aisles of exhibits at N.C.M.A. convention in Cleveland, Ohio

"Thrifty" tells how DURAPLASTIC* helps stave off production problems

I'm not pitching hay! It's a *fact* that manufacturers using Atlas Duraplastic cement report less breakage in handling green products and a reduction in the number of culls and throwbacks. And with silo staves as with other concrete products, plants find that Duraplastic gives clean, true edges and corners ... increased resistance to passage of water.

and "Nifty" says:

Good appearance of Duraplastic-made products is a major selling point. Face texture is richer, especially when harsh aggregates are used. Let me help sell your products.

LET DURAPLASTIC COMPLETE THE STORY. With Duraplastic, you can make a more cohesive, rubbery mix which holds together better . . . feeds easily through machines. Duraplastic gains preference not only for manufacturing silo staves, but also for concrete pipe, brick, block, drain tile and other concrete products.

YET DURAPLASTIC COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Ave., New York 17, N.Y.

OFFICES: *Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.*

"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company

CP-D-144

ATLAS®

DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

Makes Superior Concrete Products at No Extra Cost

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network*

INDUSTRY NEWS

Concrete Block Promotion

SALINA CONCRETE PRODUCTS, INC., Salina, Kan., has issued a publication, entitled "Salina Concrete Products Company," which is an outstanding piece of promotional literature, designed to acquaint dealers, architects, engineers, contractors and other interested persons, with the concrete block and other concrete products produced by the company. The book, which is on a personalized basis, not only describes and illustrates the finished products, but also discusses the characteristic qualities of the building units, methods of manufacture, and types of machinery, equipment and materials used. Recommendations are also made as to the most suitable applications of the various units in regard to type, size and physical requirements of the structure.

The book is artistically designed and attractively illustrated in both color and black-and-white, emphasizing beauty and versatility of pattern and color, as well as structural stability. Interiors and exteriors of homes, churches, schools and other buildings, utilizing the company's products, are shown. A price listing is also included. Another feature of the book is its loose-leaf arrangement, allowing for insertion of future promotional pieces.

Employe Bonus Plan

A BONUS PLAN, designed for decreasing employe absenteeism, is incorporated into a new contract agreed to by two local unions and four Arizona concrete block companies. The firms involved are Builders Supply Corp., Insolite Manufacturing Co., Union Rock & Material Co., all of Phoenix, and Arizona Pre-Cast Concrete Co., Mesa, Ariz. If the Wage Stabilization Board approves, employes of the four companies will be paid a bonus of 5 cents per hour for each 4-week period worked without absenteeism (bonus would not be forfeited in case of specifically excused absenteeism). The new contract would also give a 7½-cent across-the-board increase, plus other benefits.

New Association

EASTERN CONCRETE PRODUCTS ASSOCIATION has been formed by a group of concrete block manufacturers in eastern and central Pennsylvania. Offices of the new association are at 221 E. Orange St., Lancaster, Penn. Officers are Harry H. Longenecker, Building Units, Inc., Primos, Penn., president; Thomas F. Bausman, Harrisburg Building Units, Harrisburg, Penn., vice-president; Walter W. Sipe, York Building Products Co., York, Penn., vice-president; H. Melvin Binkley, Binkley and Ober, E. Petersburg, Penn., secretary-treasurer; and Ira F. Honaman, executive director.

Otis H. Manchester, Jr., secretary-treasurer, Concrete Transport Mixer Co., St. Louis, Mo., has been elected chairman of the Truck Mixer Manufacturers Bureau of the National Ready Mixed Concrete Association

Change of Ownership

STANDARD PAVING & MATERIALS, LTD., Toronto, Ont., has acquired controlling interest, at a cost of $945,280, of Concrete Pipe Ltd., which has plants in Toronto and Woodstock. Consolidated Sand & Gravel, Ltd., subsidiary of Standard Paving & Materials, has marketed the output of Concrete Pipe, Ltd., under a sales agency agreement since Standard formation in 1929. In addition, Concrete Pipe, Ltd., has been a substantial purchaser of the products of Consolidated Sand & Gravel.

Ready-Mix Plant

GRAYSON LUMBER CO., Birmingham, Ala., since the installation of its ready-mixed concrete plant about three years ago, has become one of the largest building material dealers in the Birmingham area. Equipment at the concrete plant includes a centrally located batching plant, equipped with electrically controlled weight and measurement equipment, and a fleet of transit-mix trucks, with capacities ranging from 3 to 7½ cu. yd.

Asbestos-Cement Plant

NATIONAL GYPSUM CO., Buffalo, N.Y., recently announced the acquisition of Asbestos Corp. of New Orleans and St. Louis. Clifford F. Favrot will continue as president of Asbestos Corp., which will be operated as a subsidiary of National Gypsum Co.

Cover Picture

THIS MONTH'S CONCRETE PRODUCTS cover picture shows the milling throngs at the Concrete Industries Exposition of the National Concrete Masonry Association held in the Auditorium, Cleveland, Ohio, January 26 to 29. Attendance at the exhibit and convention set a new record.

ATHENS CONCRETE, INC., Athens, Ohio, has begun operations of a ready-mixed concrete plant at Logan, Ohio, which will be known as the Logan Division of Athens Concrete, Inc. Equipment includes a batching plant and two transit-mixer trucks. The Athens plant operates five mixer trucks.

EUREKA LUMBER & SUPPLY CO., a new firm established by Don Hand, has begun operation of its ready-mixed concrete plant at Eureka, Kan. Equipment includes two 3-cu. yd. transit mixers. Plans are now in progress for the addition of a concrete block plant.

JOHN J. WIERSEMA and Robert Larson, Fulton, Ill., have begun production of Cavitex, which is a masonry brick. The brick is about one and a half times as long as the conventional type and is produced in colors. It has also been tested for facing and water absorption.

HOOSIER LIME & STONE CO., Salem, Ind., is completing a new plant for the production of steam-cured block. The company is owned by Heber Hobbs and sons, John and Quentin Hobbs, who acquired the plant in 1947.

MONTGOMERY CONCRETE, INC., has been established at Altoona, Penn., by Donald W. Montgomery. Plant facilities include a 400-bbl. cement bin with overhead scales, a 3-compartment batching bin and a fleet of transit-mixer trucks.

ED MILLER & SONS, Johnstown, Penn., producer of concrete block, is building a new block plant between Riverside and Krings, Penn. The new plant will cost approximately $100,000. Present operations are located in Riverside.

ROSS CONCRETE AND MORTAR CO., Huntington, W. Va., was recently awarded a $95,000 federal contract to supply 7500 cu. yd. of concrete for use at the new atomic energy project in Pike County, Ohio.

CENTRAL STATES CONSTRUCTION CO. of Minnesota is building a ready-mixed concrete and block plant at a gravel deposit near Kinnikinnick, Ohio. The company has negotiated a 50-year lease for the 195-acre tract.

OTHELLO CEMENT PRODUCTS, INC., Othello, Wash., has amended its corporation charter, increasing the number of directors to five, and increasing capital to $250,000.

CONCRETE MASONRY MANUFACTURERS ASSOCIATION has announced the removal of its offices from 3230 W. Sixth St. to 3250 W. Sixth St., Los Angeles 5, Calif.

CONCRETE SUPPLY CO., Charlotte, N.C., is building a $250,000 ready-mixed concrete plant. This makes its third plant in Charlotte. H. E. Shelby is general manager.

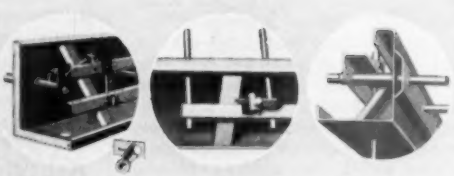
BUSY CONTRACTORS WILL LIKE THIS FAST TURNOVER IN ROAD-AIRPORT FORMS . .

Heltzel Combines Two Standard Forms To Simplify Handling • Reduce Inventory

If your business calls for multiple form sizes you'll want to know about the HELTZEL DUAL-DUTY FORM. Here are two individual form heights combined into a single form section. Simply turn it on its side and you have the second height. Latest form designs lend themselves to this arrangement naturally—providing lower initial purchasing costs and greatly reducing inventory problems.

The forming of the second rail on each form section greatly strengthens the section—assuring longer life. What's more, every DUAL-DUTY carries all the normal Heltzel features so popular with contractors today: corner-to-corner bracing—formed stake pockets; single, sure-bind wedging that eliminates counter thrust of a second wedge—and re-rolled rail stakes, heat-hardened and sharpened to penetrate toughest rock conditions, assuring firm grip and perfect form alignment.

Before you buy be sure to look over the one complete line of standard and special sidewalk, road, curbing and airport forms designed and built by the HELTZEL STEEL FORM AND IRON CO., WARREN, OHIO. Send for additional literature. Representatives throughout the world.



Three integral form devices, exclusive with Heltzel, can be readily adapted to Dual Duty Form for jobs calling for doweling. Field tested, these methods assure accurate alignment, fast handling and easy stripping. Others engineered upon request.

Naturally It's A

THE HELTZEL STEEL FORM AND IRON COMPANY — Heltzel — BUILDS IT BETTER — WARREN, OHIO

ROAD JOINT MACHINE COMPANY — Flex Plane — MECHANIZED CONSTRUCTION EQUIPMENT — WARREN, OHIO

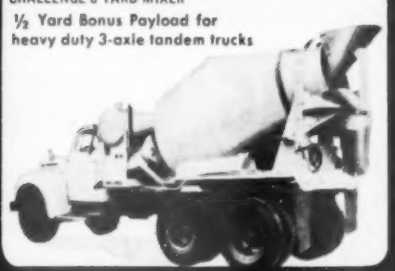
only Challenge gives you these BONUS PAYLOAD Sizes...

CHALLENGE 3½ YARD MIXER
½ Yard Bonus Payload for standard 2-axle trucks

CHALLENGE 4 YARD MIXER
1 Yard Bonus Payload for heavy duty 2-axle trucks & light 3-axle tandem trucks

CHALLENGE 5 YARD MIXER
½ Yard Bonus Payload for standard 3-axle tandem trucks

CHALLENGE 6 YARD MIXER
½ Yard Bonus Payload for heavy duty 3-axle tandem trucks



Look For The N.R.M.C.A. Nameplate on Every Size Challenge Mixer

Being a member of the N. R. M. C. A., Challenge Mixers are made *and rated* in strict accordance with N. R. M. C. A. specifications. On inspection pours where mixers can only deliver their rated capacity, each of these Challenge Mixers will deliver a *Bonus Payload* over competitive mixers of comparable size.

Don't be fooled by a 3 yard mixer carelessly referred to as a 3½ yard mixer or a 4½ yard mixer referred to as a 5 yard mixer.

COOK BROS. TRUCK EQUIPMENT

COOK BROS.
EQUIPMENT COMPANY
1815 No. Broadway, CApitol 2-9111
Los Angeles 31, California

Exclusive National Distributors for CHALLENGE, The Modern, Streamlined Truck Mixer

STANDARD OF THE INDUSTRY!

LEFT: Discharge of Processed Lime Putty into receiving hopper. Note thickness of lime mat (1½").

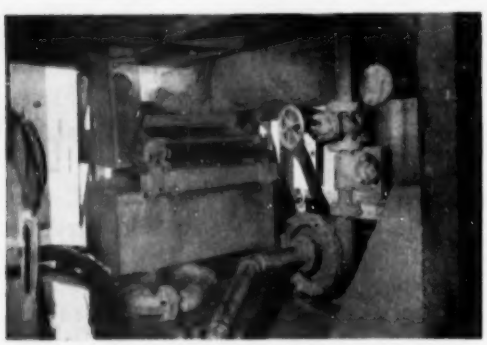
ABOVE: Coil springs on filter drum.

FASTER - MORE ECONOMICAL WAY TO MAKE BETTER QUALITY LIME PUTTY

NOW you can produce high-quality Lime Putty in a fraction of the time, with greatly reduced work, less ground space for equipment, and at lower cost. Two men can operate the plant.

This revolutionary new Miller-Komline Process assures uniformity of quality, and produces a cool putty ready for immediate use by plasterer or bricklayer. Lime putty of varying density can be produced according to customer requirements.

Ready-mixed Concrete Producers having surplus truck mixers can readily diversify their business, guaranteeing more continuous use of their equipment through production of ready-mixed brick mortar.



Underside of slaker, vibrating screen, and pump to filter.

A NEW, REVOLUTIONARY PROCESS. DIFFERS FROM PLANTS NOW IN USE IN THE FOLLOWING PRINCIPAL WAYS:

- Eliminates the large, expensive "aging" vats or tanks, along with time for cooling and dewatering the putty.
- Putty produced through this process requires no "aging." The time element is literally reduced from days to minutes.
- The putty is completely conditioned for immediate use by the mason as it leaves the machine.
- Samples of putty taken from any part of the machine are always uniform with respect to coolness and consistency.
- In the case of ready mixed mortar plants, the Miller-Komline Process can be used satisfactorily with either high calcium or dolomitic quicklime.
- Greater capacity per dollar of investment is obtained with this process over other putty plants employing the "aging" tank principle.
- It is very simple to operate. It is low cost.

WRITE FOR INFORMATION ON HOW THIS NEW PROCESS CAN INCREASE YOUR VOLUME AND PROFITS

EXCLUSIVE PATENT LICENSES ISSUED TO QUALIFIED PARTIES

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SALES ENGINEERS FOR THE MILLER–KOMLINE PROCESS

SUMMIT, NEW JERSEY

JAEGER 1953 models give you maximum payload plus*

* *Note below latest Mix-Plus advantages that only Jaeger gives you*

Improved Power Train

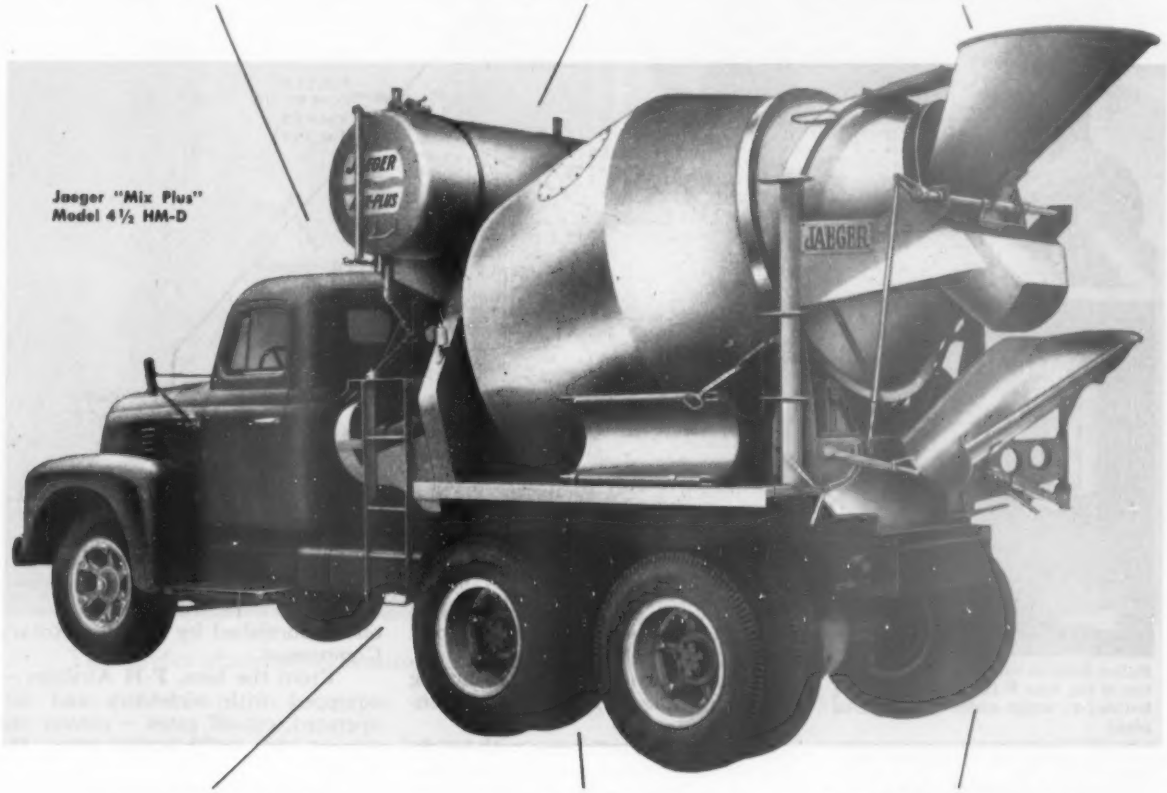
Perfected "Comatic" hydraulically actuated transmission with improved transmission mounting and closer coupled intermediate drive. Eliminates necessity for universal joint, insures no deflection over the roughest ground both on and off the road.

Trouble-Free Chain Drive

Jaeger engineered with 2" pitch, 1⅛" roller chain and extra large diameter drum sprocket which reduces chain pull by ⅓, gives longer life to both chain and sprocket. Sprocket is an alloy steel ring with accurately positioned, replaceable, forged and hardened steel teeth.

Open End Loader With "Back Away" Gate

Improved "Back Away" gate closes the lower half of drum opening to prevent cement blow-back and water spillage when charging, and loss of concrete when climbing grades. *Backs away* instantly and completely from the drum for unimpeded discharge.



Jaeger "Mix Plus" Model 4½ HM-D

Improved Drum Mounting

"A" frame and drum roller supports are engineered to carry maximum drum loads with a far greater safety factor than cheaply built truck mixers.

For complete information see your Jaeger distributor or send for Specification TMH 2

"Dual Mix" Drum

Famous "Dual Mix" drum charges and discharges faster, and produces higher strength concrete because of its correct diameter-to-length ratio, continuous spiral mixing blades, and exclusive throw-back blades. Built for 8 to 10-year's service, double that of flimsily constructed drums.

To-The-Spot 3-Piece Chute

Chute head and quick coupling sections give choice of 5', 8', 10' and 13' lengths for any discharge condition. Quick-adjusting, positive chute support mechanism of heavy-duty cast steel. Chute head instantly swings aside for discharge to extra large (2 yard) concrete buckets.

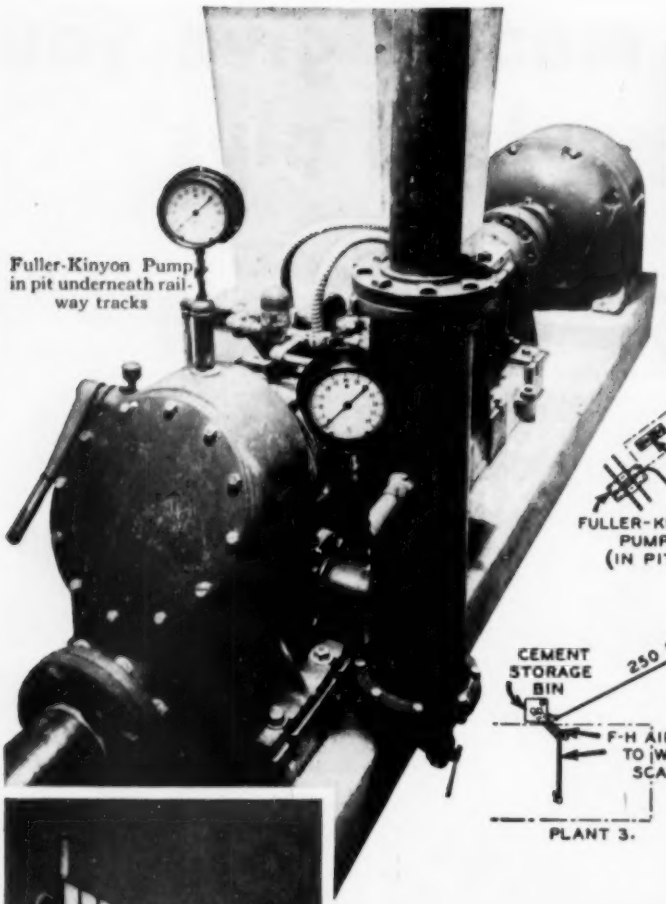
THE JAEGER MACHINE COMPANY

603 Dublin Ave., Columbus 16, Ohio

World's largest builder of Truck Mixers, Agitators • **Pumps** • **Compressors** • **Concrete Mixers** • **Paving Machinery**

PAT BLOX gets fast • clean UNLOADING and DISTRIBUTION with the

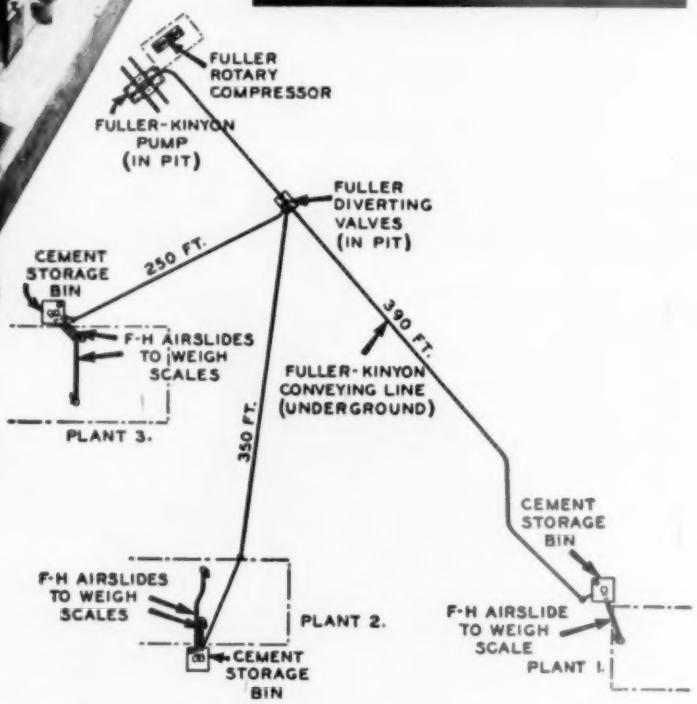
FULLER-KINYON CONVEYING SYSTEM



Fuller-Kinyon Pump in pit underneath railway tracks

Fuller-Kinyon transport line entering top of bin. One F-H Airslide from bin bottom to weigh-scale. (Plant 1 in plan)

Fuller-Kinyon transport line entering top of bin. Dual F-H Airslides from bin bottom to weigh-scales. (Plants 2 and 3 in plan)



This fast-growing, concrete-block plant, really three plants in one, solved its unloading and distributing problem with a Fuller-Kinyon Conveying System.

To avoid interference with trucking and other plant activities, incoming cement is pumped underground from hopper cars to three storage bins by a Fuller-Kinyon Pump with a 200-bbl. an hour capacity. Diverting valves in the conveying line regulate distribution from pump to bins. The conveying system operates on air furnished by a Fuller Rotary Compressor.

From the bins, F-H Airslides — equipped with airfeeders and air-operated, cut-off gates — convey the cement to weigh-scales over the mixers.

If unloading and distributing of dry, pulverized materials present a problem in your plant, a Fuller engineering study may quickly determine a more convenient, faster, more economical system. No obligation, of course.

Fuller

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DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

P-139
1625

You prefer champagne because it's a sparkling, tangy drink . . . fit for kings . . . universally accepted as tops in beverages. Ready-Mix Operators prefer Smith-Mobiles because they too are tops in their field . . . the finest and most dependable truck mixers that money can buy. So why be satisfied with ordinary truck-mixers when you can get these top quality Smith-Mobiles at relatively low cost? Contact your nearby Smith Distributor. Ask for new bulletin.

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CONCRETE MIXERS

For BIGGER and BETTER Concrete Mixers and Truck Mixers . . . LOOK TO SMITH

A 7326-1P

increases hourly yardage output over 10% with Koehring *fast-shuttling* DUMPTORS

THERE is no need to turn at the loading unit, along narrow haul roads, or on the fill with fast-shuttling 6-yard Dumptors. Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse, lets Dumptors operate with equal ease in both directions. Every turn saved cuts 15 seconds off your cycle time, and adds up to an important increase in yards hauled per hour. Here's a typical example:

On a 1,000-foot haul, eliminating only 2 turns saves ½ minute every round trip. Where you would get an average of 13.6 trips per hour with 2-turn operation, Dumptor *no-turn shuttle hauling* gives you 15.4 trips — an increase of 1.8 trips an hour on the same 1,000-foot haul.

Fast, easy spotting and 1-second gravity dump help keep production high. Costs stay low because there are no complicated, mechanical body hoists to slow up haul cycles — no expensive hoist maintenance or down time to eat into your profits. Let your Koehring distributor show you Dumptor's many other cost-cutting advantages.

KOEHRING COMPANY, Milwaukee 16, Wis.
Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

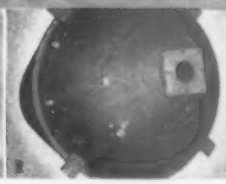
KOEHRING (KOEHRING HEAVY DUTY) **DUMPTOR®**

CK233

This mountain-side job shows typical no-turn shuttle advantage. Hauling along narrow ledge, Dumpter spots close to Koehring 1½-yd. 605, gets its load, drives to fill, dumps, returns to shovel — without turning.

INCREASE BATCH PLANT PROFITS
with Johnson accessories

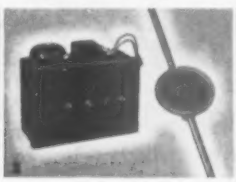
Rotary Vane Compressor gives 7 cu. ft. air pressure per min. cement aeration. 15-lb.-limit relief valve.



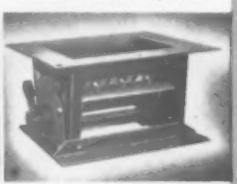
Aeration Fittings properly spaced in Johnson bins and silos keep cement free flowing.

2-Way Elevator Discharge Valve, a flap-type chute, directs flow of cement to the storage tank.

Pivoted Distributor feeds aggregates to bin sections. Positions and locks by ground control wheel.

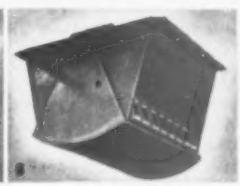


Bin Signals accurately register high and low levels in cement or aggregate. Dust-proof.



Rotary Plug Valve accurately controls cement flow. Plug operates freely in self-aligning bearings.

Receiving Hopper 30 and 50-bbl. sizes, feeds bulk cement to elevator. All-welded, weather-proof.



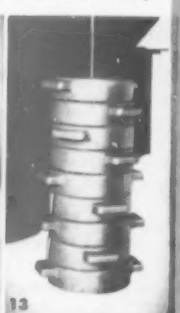
Aggregate Fill Valves single clam, radial type for jam-proof closing. Hydraulic pressure lubrication.

Tunnel Gate for stockpile reclamation. Single radial clam. Skirt board is hinged, opens and locks securely.

Safety Cage of 28" steel, welded to casing, can be furnished with all Johnson elevators.

Water Weigh Batchers, semi- or full-automatic types. 120 and 240-gal. sizes available.

Elevator Buckets in many sizes for aggregates, and cement. **Steel Chain** has carburized knuckles.



Batcher Test Weights in sets of nine, 50 lb. calibrated units, and two 25 lb. steel hangers.

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CHAMPAIGN, ILLINOIS
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YOU CAN CUT DELIVERY COSTS 50% WITH THE NEW SUPERLITE UNLOADER

Load on the Way to the Job

PATENTED

Unloading Two Block Cubes Quickly, Efficiently, Economically

THE SUPERLITE UNLOADER will unload two cubes of 75 each heavy weight blocks or two cubes of 90 each light weight blocks. The SUPERLITE is a sturdy, simple mechanism powered by a self-contained gasoline motor. It rolls smoothly on horizontal tracks laid along both edges of the flatbed truck. Fits snugly over two side-by-side cubes of blocks.

OFFERS THESE FEATURES

- Fast
- Safe
- Economical
- Light Weight
- Proven Performance
- Unloads two cubes at a time
- No special body construction
- Easily installed by your own plant mechanics
- Fits any flatbed truck, trailer or semi-trailer
- Strength without excessive weight

FAST — VERSATILE — ECONOMICAL and the ONLY UNLOADER available for UNLOADING TRUCK AND TRAILER COMBINATION

For Information and Prices, Write Today

OPERATION IS SIMPLE - FAST - SAFE

How it works: Lift bars are swiftly passed through the cores of the bottom row of blocks in the cubes. A hydraulic lift gently raises the cubes several inches above the truck bed. The Unloader, carrying the two cubes of blocks, rolls slowly back the length of the truck and onto two hinged extension tracks. The cubes are lowered steadily to the ground, the lift bars pulled out and inserted in the next cubes to be unloaded, and the truck moves forward six feet to give clearance for the next stack to be grounded.

TWO CUBES AT A TIME

With the SUPERLITE UNLOADER you can load your trucks with your fork lifts in the usual manner. It will unload two cubes at a time quickly and efficiently. Unloading unit may be easily removed and your truck is again a standard flat rack open bed.

SAVES ON THESE OTHER UNLOADING PROBLEMS TOO

Unloading Concrete Pipe
Sacked Cement
Cement or Clay Tile
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All types of sacked articles
Crates and Boxes
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BUILDERS EQUIPMENT CO.

4012 N. CENTRAL PHOENIX, ARIZ.

USE A SUPERLITE UNLOADER FOR BLOCKS - BRICK - CONCRETE PIPE

Views of the exhibits at the Concrete Industries Exposition in the Public Auditorium, Cleveland, Ohio

Concrete Masonry Industry

PLANS EXPANDED PROGRAM

National Concrete Masonry Association annual convention outlines plan for enlarged program of advertising and research activities. Group meetings discuss problems of concrete block producers using lightweight and heavy aggregates

THE THIRTY-THIRD ANNUAL CONVENTION of the National Concrete Masonry Association, held concurrently with the eighth biennial Concrete Industries Exposition at Cleveland Public Auditorium, Cleveland, Ohio, January 26-29, proved to be one of the most successful ever held. Total attendance was 4600, reflecting the great drawing appeal of the machinery and equipment exhibit and the continued prosperity of an industry that has tripled its sales over a 10-yr. period. The 1955 biennial exposition will again be held in Cleveland.

According to established pattern, all general sessions were held in the morning and each of the four afternoons was available for inspection of the 72 exhibits that filled the exposition hall. Simultaneous short "aggregate" meetings were held during three of the afternoons for those interested in discussions of problems related to the particular aggregates they use. Among them were pumice, natural aggregate, Superock, Celocrete, Waylite, expanded shale, Enslite and cinder aggregate meetings.

The program was well diversified. Starting with a general session, there followed an entire session devoted to advertising and sales promotion, one dealing with technical matters, while plant and production problems were topics for the concluding session.

President A. G. Streblow, Basalt Rock Co., Napa, Calif., presided for the opening general session, which heard the president's address, reports of the treasurer, executive secretary, Washington office, and the various committees. This session concluded with a talk on sales promotion and a panel discussion on the relation of the industry to the mason contractor.

Many forms of promotion, advertising and other aids to sales were covered in the second session under the chairmanship of Philip Paolella, Plasticrete Corp., who is chairman of the promotion committee. The great emphasis on this phase of activity and on means to improve quality, stressed as essential throughout the entire convention, was significant. There has been great plant expansion throughout the past ten years and the industry is gearing itself to maintain and enlarge the high production goals already achieved in the face of increasing competition from other building materials. In 1952 an unprecedented 1¾ billion 8-in. equivalent units were sold which is about four times the total as recently as 1946, and the industry has a productive capacity today which will require intensified promotion effort to hold its gains and to enlarge markets commensurate with productive capacity.

Paul Bronson, chairman of the technical problems committee, presided for the technical session. Principal subjects covered in that session were mechanical unloading of block from delivery trucks, applications for prestressed concrete masonry units, the performance of reinforced concrete masonry in the Tehachapi earthquake in California and the report of the director of engineering.

President-elect Sam Paturzo, presided for the concluding session. Jay C. Ehle, Cleveland Builders Supply Co., Cleveland, Ohio, was moderator for a problems panel on production

Another group looking over the Michigan association exhibit. John A. Kuiken, Louis A. Mooney and Samuel A. Mooney, all of Mooney Bros. Supply Co., New Castle, Penn.

John K. Selden (University of Toledo) explaining block test in Besser booth

and there was a paper covering fundamentals of producing high quality concrete masonry units.

A luncheon meeting was held for local, state and regional associations to discuss problems peculiar to groups functioning at the local level. There are some 24 such concrete masonry associations now in operation.

Entertainment included a get-together party through the courtesy of Cleveland area producers and the annual banquet with floor show and dancing. Hosts for the get-together party were Akron Brick and Block Co., Atlas Block Co., Bennett Concrete Stone Co., Cleveland Builders Supply Co., Concrete Masonry Corp., Garfield Block and Supply Co., Geist Coal and Supply Co., Ideal Builders Supply and Fuel Co., Koltcz Concrete Block Co., Charles Svec, Inc., and Union Sand and Supply Co. Special ladies events consisted of a tea, luncheon and play.

Officers

Sam Paturzo, V. Paturzo Bro. and Sons, Inc., Baltimore, Md., was elected president of N.C.M.A., succeeding A. G. Streblow, Napa, Calif.; Edmund H. Brooke, National Brick and Supply Co., Inc., Washington, D.C., and M. E. Rinker, Rinker Materials Corp., West Palm Beach, Fla., were elected vice-presidents and Carroll Strohm, Jr., Nashville Breeko Block and Tile Co., Nashville, Tenn., was re-elected secretary-treasurer.

Three new members of the board of directors, elected for 5-yr. terms, are Philip Paolella, Plasticrete Corp., Hamden, Conn.; A. R. Waters, Carter-Waters Corp., Kansas City, Mo.; and Herbert Vincent, Cinder Block, Inc., Detroit, Mich.

President's Address

President A. G. Streblow, in his president's message to the opening session, sounded what amounted to the keynote for the convention and the industry in the years ahead when he stressed the necessity for much greater emphasis on promotion of high-quality products and urged that more funds be allocated for the purpose.

In his opening remarks, Mr. Streblow said that the size of the attendance was in itself a good measuring stick of the industry and its importance. He then told of the association's efforts, through a special committee on finance, to increase funds while maintaining the current dues structure. He touched upon the growing interest in establishing regional associations over the nation which would be tied to N.C.M.A. on a national level, but function at the grass roots level in meeting local problems of their members. Progress is being made toward forming such a regional association in the Pacific Northwest, he said, and the first such group has now been organized in the southeast.

Mr. Streblow told of the increasing problem facing the industry because of requirements restricting the moisture content of units at time of delivery. This problem is the concern of the entire industry, he said, and many plants are being equipped to meet it. The establishment of the Washington office under Theodore Leba, Jr., was considered a needed development by Mr. Streblow.

The most important thing facing the industry, said Mr. Streblow, is the need for more promotion and effective marketing. The fact that the industry sold about the same volume of units in 1952 as in 1951 is significant in his opinion. It marks the first time in a number of years that volume has not shown a good increase in volume of sales, meaning that a plateau has been reached which sets up a challenge.

During the past 10 years, emphasis has been on productivity with the result that potential capacity has increased enormously to unknown figures. Basically, he said that the industry's main object must be promotion and, secondly, production, but with quality of product necessary to do the job.

The big change which made rapid growth possible during the past few years came with the development of high capacity automatic machines and greater availability of lightweight aggregates, coupled with an unprecedented demand, he said. The industry did not make opportunities for itself but took advantage of the favorable conditions, and now must aggressively create market opportunities to keep its plants busy.

The problem of cracking due to shrinkage is a challenge which the industry should accept and take steps to overcome. The industry should be ever alert to new uses for its products and exploit those which have merit, he said, in referring to wall systems for multi-story buildings as an example of large volume markets to come as more is learned about reinforcing. In conclusion, he said that the N.C.M.A. budget is far too small and should be increased.

Executive Secretary's Report

Executive secretary E. W. Dienhart's report touched upon milestones in the growth of the industry and suggested opportunities ahead for the younger members entering the industry. He harked back to the time when there were no high production ma-

Two views of exhibits which attracted wide attention at N.C.M.A. convention

chines or supplies of lightweight aggregates, which greatly restricted the applications of concrete masonry. Then, there was no opportunity to reach into some of today's markets such as exposed masonry in churches and residences.

Concrete floors were pointed to as markets to challenge the younger producers. The groundwork for developing that outlet has been laid, he said, and the potential for concrete masonry in floors totals to a much larger area than for the entire wall market. Opportunity for greater development of the market for concrete masonry in homes is increasing, he said, and the challenge consists largely of breaking down the resistance in the larger cities. The use of split block, half block and other variations which have appeal will help the cause. In conclusion, Mr. Dienhart said that the future of the industry is very bright.

Washington Report

Theodore .Leba, Jr., Washington representative of N.C.M.A., since October, 1952, presented his first report to the association. At the outset he outlined the objectives of his position which involves, among many other things, close liaison with government agencies to see that concrete masonry gains widest possible acceptance in specifications.

Mr. Leba does not believe that the concrete masonry industry is likely to be affected seriously even should a recession come to pass, as feared by some businessmen. He thinks that demand for the industry's products will continue on the increase, because the peak of the defense production program has not yet been reached and because the removal of restrictions on certain classes of construction will benefit the industry. Mr. Leba concluded by inviting members to call on him for individual service, should the need arise.

Architectural Competitions

C. A. Sirrine, executive secretary of the Concrete Products Association of Michigan, presented a talk entitled "A Pattern for Promotion" which was based on the results of an architectural competition which was sponsored jointly by his association and the Michigan Society of Architects.

Mr. Sirrine gave the details of the competition and had available, for distribution, the entries which were submitted in the competition. Prize money was provided by his association for the competition, which was open to any architect or student of architecture in the state of Michigan.

A requirement in sponsoring such a program is that the prizes be high enough to attract architectural talent. Thirteen prizes were offered, totalling $3250 with a $1000 top prize to the winner. The competition was well publicized and 58 entries were actually received, which were retained as the property of the association. Cost to the members for the entire program was $4000 including the prizes. As a result of the competition, two Detroit concerns soon started building homes from the designs which, of course, emphasize concrete masonry to the fullest possible extent. When these homes are completed, cost figures will become available.

Mr. Sirrine believes that similar competitions should be sponsored by other local associations and that a national competition might then be conducted and supervised by the N.C.M.A.

Officers, directors and past-presidents of the National Concrete Masonry Association at board of directors meeting. Left to right, standing: Ben. Wilk, Deane R. Lynde, Henry E. Buchholz, Walter J. Manhardt, George W. Katterjohn, Harve E. Kilmer, and John Strandberg. Kneeling, left to right: H. W. Bush, A. G. Streblow, Glenn C. Barnes, and Harold L. Spaight

Canadian Association

W. C. Coupland, president, National Concrete Products Association, Canada, in a message from his group, expressed appreciation for all that the concrete masonry industry in the U.S. has done to aid development of the industry in Canada. He particularly thanked Fred Reinhold, Buffalo, N.Y., whose assistance has already been rewarded with an honorary membership in the Canadian association.

The Canadian group has grown to a membership of 205. Monthly regional meetings are held throughout Canada, an insurance plan has been developed for adoption by the membership, monthly bulletins are released, and publication of a concrete products magazine to be issued four times yearly has been started. Mr. Coupland invited American producers to attend his association's meeting in Toronto which was held during the first week in February. He concluded by predicting that 1953 would be the biggest year yet for the industry in Canada barring serious shortages of cement and steel.

The Mason Contractor

"The Role of the Mason Contractor in Today's Construction Market" was the topic of Wm. Nelson, president, Mason Contractors Association of America. Mr. Nelson then served as moderator for a panel discussion by three mason contractors and three concrete masonry producers, Benjamin Wilk, Detroit, Mich., John L. Strandberg, Kansas City, Mo., and Ralph Condo, Somerville, N.J.

Mr. Nelson expressed the opinion that the concrete masonry producer should give greatest recognition to the mason contractor wherever possible because the mason contractor uses masonry exclusively whereas the general contractor is not par-

Left to right: Robt. Anderson, Crown Sidewalk & Block Co., Inc., Minneapolis, Minn.; Jay C. Ehle, Cleveland Builders Supply Co., Cleveland, Ohio; Philip Paolella, Plasticrete Corp., Hamden, Conn.; and Herbert Vincent, Cinder Block, Inc., Detroit, Mich., officers and directors of the association

John Strandberg, left, chinning about his European trip with Theodore Leba, Jr., Washington representative of N.C.M.A.

ticularly interested in masonry materials. He also suggested that producers develop a packaging program whereby the mason contractor's handling problems would be simplified on the job. He would like to see block handled, in a package, right on to the scaffold itself.

Ralph Condo, who began an educational program in Somerville, N.J., high school two years ago to develop interest among young men in becoming masons, pointed up the growing shortage of masons and stressed that concrete block are only as good as the mason who places them in the wall.

Comments by others on the panel amounted to stressing the need for each of the two industries getting better acquainted in order to help each other with its problems. According to Ben Wilk, it would be a good thing for masonry producers to encourage mason contractors to visit their plants in order to gain appreciation of the high quality standards being met. Joint efforts of the two groups, it was brought out, could eliminate some of the high-cost laying factors which have worked to the detriment of the industry in some areas.

Advertising and Promotion

Philip Paolella, chairman of the promotion committee, opened the Tuesday morning session with the showing of the interesting film, "The Magic Key," produced by the U.S. Chamber of Commerce, illustrating the importance of advertising in our way of life. S. H. Westby, manager, housing and cement products bureau, P.C.A., told about the role of the Portland Cement Association in research and promoting the sale of concrete masonry. Mr. Westby reviewed the research activities of the association, including fire-resistance tests to obtain lower fire insurance ratings, load-bearing tests at the University of Illinois, the Elmhurst weathering and curing tests, etc. He referred to the new laboratory facilities, and the promotional activities of the district offices, the new literature such as the Concrete Masonry Handbook, the ad mat service, and the national advertising in such publications as *Better Homes and Gardens*. National advertising of the association now reaches 22,500,000 people per month. He pointed out, however, that to clinch sales it is up to the local producer to follow through with his individual sales and advertising program.

Harry Emerson, left, and Jerry Watt, both of Lehigh Portland Cement Co., took a load off their feet in ROCK PRODUCTS booth

R. N. Jones, of *House and Home Magazine*, said that while there was a potential annual market for one million housing units, the industry was reminded that during the war there was a big reduction in marriages which would be reflected later in the housing market that would necessitate a more concentrated sales effort. He mentioned the trend to modernistic design created by architects and cautioned the industry to conform to this trend by producing units which would fit into these new designs. Among other things, he mentioned air conditioning, the attached garage, the disappearance of the kitchen as a separate room like the dining room, and modern apartment design as factors influencing the market for block. Mr. Jones said the industry should not think in terms of supplying a market but of creating a market. He strongly urged a national and local advertising and promotion program in which the product would be sold as part of an idea.

W. F. Markert, director of promotion, N.C.M.A., in his talk on "40,000 Readers Can Be Wrong," said the industry is spending very little money to protect its market. As a comparison, he said that the furniture industry is spending $10,000,000 annually, and the stone, clay and brick industry is spending about $26,000,000. He referred to a recent survey of readers of a magazine which indicated that only four percent preferred concrete masonry, 32 percent preferred brick, and 36 percent preferred wood. The SCR brick is being promoted by the Clay Products Institute to eliminate back-up, and they expect to double sales. The brick industry is spending $20,000 in Iowa alone to promote this unit. Durability and fire-safeness of concrete masonry is not being adequately promoted as wooden frame construction continues to be the major method of construction.

Mr. Markert said that while the market potential is 2,500,000 housing units annually, the end of the sellers' market is in sight. There will be a big demand in the future for new schools, public utilities and shopping centers. He referred to a nationally-known mattress manufacturer's test of advertising in which the nationally-advertised brand had an advantage of 15 to 1 over a product made by the same manufacturer but not sold under the advertised brand name. An N.C.M.A. survey indicates that about $600,000 is now spent annually by members for all forms of advertising, but much of this expenditure is wasted, such as, the congratulatory type of advertising. He pointed out that if advertising increased business only three percent it would represent $15,000,000 additional volume for the industry. Now is the time to create public acceptance for concrete masonry. As an example of modern advertising, a film showing a short TV commercial that demonstrated the advantages of a concrete masonry house was displayed on the screen. All elements in the sale of a concrete masonry house are reached by national advertising. Mr. Markert referred to the San Francisco meeting of the N.C.M.A. board of directors which discussed the need for a national advertising campaign and more funds for research. It was suggested by this meeting that producers contribute 10 cents per 1000 units as a start in setting up this fund.

Richard Gerber of *Masonry Building Magazine* in his talk emphasized the need for the concrete masonry industry to meet competitive advertising and promotion activities of manufacturers of other building products. He urged the support of association members for the proposed national advertising program. Selling, he said, is easier when the market has been conditioned for acceptance by advertising. Mr. Gerber suggested a "Seal of Approval" mark of quality for each block, and offered the Crown Crest as an emblem mark to be placed at the end of each block. This seal program must be implimented by national advertising aimed at the builder and architect which would also reach the business, industrial and rural market. The cost of placing the emblem on each block would be about one-tenth of one cent or roughly for 100 plants it would be about one half of one percent of sales.

In the discussion which followed, Phil Paolella said three suggestions were offered: (1) to increase dues by one-third; (2) to use the Crown Crest idea as a voluntary program; and (3) to go along as in the past. Verne Frese of Layrite Concrete Products Co., Seattle, said he would go along with the Crown Crest idea. Ray Minette, president of the Wisconsin Concrete Products Association said he is for a national advertising pro-

gram, and mentioned that his association is starting a state-wide program. Al Streblow, president of the association, suggested an increase of dues for everyone as the fairest method. Ray Tresch of Woodbury Concrete Products Co. said that the smaller manufacturers also were glad to support the program. Paul Bronson of the technical problems committee said that funds for research were entirely inadequate. Members in attendance were asked to express their preference as to whether they wished the program financed through an increase in dues for all members or financed through a voluntary program open to all members. A mimeographed ballot was distributed to determine this preference.

Regional Associations

Officials and representatives of state and regional concrete masonry associations were guests of N.C.M.A. at a luncheon Tuesday in the Auditorium Hotel for the purpose of talking over mutual problems. Mr. Dienhart and Mr. Streblow welcomed the members. Mr. Streblow said that regional associations can accomplish a lot, but that there are many functions only a strong national group can undertake. Individual representatives then introduced themselves and described their association's activities.

Carl Smithwick, Portland, Ore., told of the formation of the Northwest masonry group. He hopes that eventually the association will have a full-time engineer and secretary.

The New York State association, according to Garson Dinaburg, Binghamton, N.Y., successfully fought exclusion of concrete masonry from state specifications with assistance from N.C.M.A.

W. E. Coupland, Toronto, Canada, a guest representing the National Concrete Products Association of Canada, suggested that a part of national dues be returned to local groups for their activities. Ray Minette, Milwaukee, Wis., told of his group's activities in embarking upon a promotion program.

W. B. Hovey, Santa Fe, N.M., reported that of 29 block plants in his state, only two were N.C.M.A. members. He suggested that local associations collect dues and send a certain proportion to the national association. Mr. Dienhart replied that, though professional groups follow this method of dues collecting, he doesn't think it would work with N.C.M.A. Furthermore, the association's counsel has advised against affiliating local groups, for then the national would be responsible for actions taken by any local group.

Vern Frese, Seattle, Wash., said that at the Washington group's meeting many producers indicated they did not want to duplicate paying dues to both the local and national associations.

Mr. Dienhart suggested that state and regional association representatives hold an "off-season" meeting apart from the national convention, when members are less rushed. This proposal met with general favor, and after considerable discussion it was decided that three representatives should attend from each group. This meeting will probably be held in Chicago during the summer.

Left to right: T. K. Nitterhouse, Nitterhouse Concrete Co., Chambersburg, Penn.; Ross H. Bryan, Bryan and Dozier, consulting engineers, Nashville, Tenn.; T. L. Goudvis, Concrete Masonry Corp., Elyria, Ohio; and C. B. Dozier, Bryan and Dozier

Wednesday Session

The technical session was presided over by Paul Bronson, chairman, technical problems committee. In his opening remarks Mr. Bronson told of the formation of this committee and its functions. It works with N.C.M.A.'s director of engineering in developing applications for concrete masonry. Problems which have arisen are the allocation of funds for research and for development, and the streamlining of publication of information. The new committee chairman, Mr. Bronson said, is R. Neil Christy, Marietta Concrete Corp., Marietta, Ohio.

R. E. Copeland, director of engineering, reviewed the year's important technical developments. One of the biggest boosts to concrete masonry was its excellent performance in the Tehachapi earthquake. This proved the logic of using steel reinforcing, and may provide data towards design of atomic blast-resistant structures. In addition, Mr. Copeland suggested, it may lead to more use of concrete masonry.

The second technical development was the completion of four new rotary kilns for production of expanded shale aggregate, and the scheduled starting of four to six additonal plants. There are now nine plants in the country producing this aggregate, Mr. Copeland said. Demand for the material still remains high; in some places it is above production.

The third development is the growing use of various methods of drying block to meet the 30 percent moisture content specification required by the Corps of Engineers, U.S. Army. More and more private builders are demanding adherence to drier block specifications, according to Mr. Copeland. Some producers have built dryers and others covered storage. Two or three manufacturers plan to switch to high pressure steam curing, which in itself is a significant trend, the speaker said.

The association's engineering activities are contained in four technical reports. Mr. Copeland presented a

Looking over the Concrete Products Association of Michigan exhibit of concrete masonry house plans. Left to right: P. J. Pennachetti, P. Bertuzzi, and John T. Pennachetti, all of Thorold Concrete Block Co. Ltd., Thorold, Ont., Canada; and F. N. Felicetti, Felicetti Concrete Products Co., Niagara Falls, N.Y.

Newly elected president of N.C.M.A., Sam Paturzo, right, is being congratulated by his predecessor, A. G. Streblow

summary of each report. Technical Report No. 37 listed special requirements for concrete masonry laid in stacked bond. The investigation was begun by O. Neil Olson, Marquette University, Milwaukee, Wis., on request by the Wisconsin Industrial Commission. No. 38 described the rate of moisture loss by natural drying under cover. Quite reasonably, it was found that ventilated stacking reduces the time of drying. Report No. 39 contained information resulting from tests on varying the curing cycle. Two of the ten conclusions developed are of particular interest to northern producers, according to Mr. Copeland: block strengths are lower in winter under the same conditions existing during summertime production, and highest strengths must be obtained by varying the curing cycle according to the outside temperature.

Report No. 40 data resulted from tests on varying mixing time and the speed of rotation of a mixer. The results indicate that varying the mixing time from 3-16 min. had no effect on block properties. A mixing time of 5 min. or less increased web cracking on lightweight units, though a 5-min. mixing period was deemed sufficient. A 3-min. time is often adequate, though cullage is increased with some units with this short a mixing period.

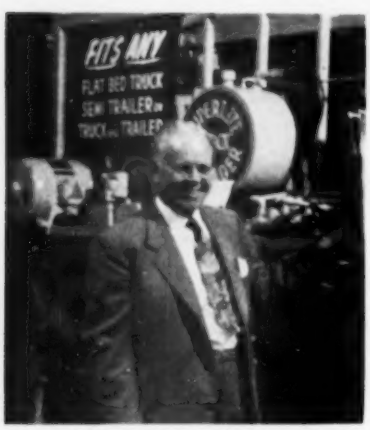
Work in progress includes laboratory tests on concrete masonry sound absorption being made at Riverbank Acoustical Laboratories of Armour Research Foundation, Chicago, Ill. A second series of tests is being made this year. Units under test are sand and gravel block. Results so far show that hollow units give better results (higher sound absorption) than solid units of the same thickness. Two coats of heavy base paint are most effective in transmission losses.

Other work includes studies of beams by Prof. H. I. Mayrose of Detroit University, a continuation of work begun two years ago, and determination of load capacities of cantilever-type walls conducted by Mr. Olson at Marquette. The latter investigation deals primarily with structural behavior of concrete masonry members, covering such things as the bond between component parts, difference in elastic strength and design of different units. There is a long-felt need for this information, the speaker stated.

R. D. Emmons, Syracuse, N.Y., paid us a visit in booth

Drying systems are also being investigated in another study. This undertaking will provide data for members to use in designing their own drying systems. Mr. Copeland listed points that have been found important.

1. Be sure block are as dry as possible before artificial drying.
2. Drying air should not be above 240 deg. F.
3. Drying rate increases with temperature.
4. There must be good air movement past the block.
5. High air velocities are not necessary—just a little air movement is required.
6. Don't underestimate heat requirement; heat required is 3000-4000 B.t.u./lb. water removed.
7. Uninsulated structures are not desirable.



Gilbert Olson, Builders Supply Corp., Phoenix, Ariz., was enthusiastic (as you can see) at interest in his new block unloader

Louis Hoffman, left, and Palmer Ross, both of Western Block Co., Nampa, Idaho

In his conclusion, Mr. Copeland said that he believes military use of concrete masonry construction will continue high, though tilt-up methods and ready-mixed concrete consumption are gaining.

Design experience gained from the Tehachapi (California) earthquake was described by E. A. Peterson, Rocklite Products, Ventura, Calif. The earthquake at Tehachapi and the one at Bakersfield 30 days later were both of intensity 7.5 (compared to San Francisco's disastrous 1906 'quake intensity of 8.25). Yet concrete masonry buildings in Tehachapi, properly constructed, showed no damage. In contrast, unreinforced buildings with either clay tile or concrete block partitions failed universally, though the largest failure was with the former construction. Eight-in. wide concrete block walls using portland cement mortar and deformed reinforcing bars were conspicuous for their non-failure.

Probably the most important design criterion resulting from a study of the earthquake area buildings was the necessity for tying roof and floors to walls. Other requirements for earthquake-resistant construction were listed by Mr. Peterson: adequate strength, quality masonry units,

Tom A. Thomas, Jr., Thomas Concrete Pipe Co., Ada, Okla., relaxes in ROCK PRODUCTS' booth

good footings, good workmanship, proper building design (roof and floors that act as diaphragms), special block shapes, and good supervision of construction.

Mechanical unloading of block from delivery units was evaluated by George Kogel, The Cincrete Corp., New York, N.Y. The great bulk and low value of concrete masonry results in a high cost of delivery of block, Mr. Kogel began. Cost of delivery tends to approach cost of aggregates and cement and is almost always higher than the housekeeping cost. However, the element of service is also a prime factor in pointing towards the need for better methods of delivery, the speaker said. Mechanical unloading can be a big saving. Frequently effective production methods are nullified by chaotic conditions at the point of delivery at the job site.

Mechanical unloading gives the producer more control; hand unloading depends on getting men to help, good weather and proper conditions. Contractor opinion is important: one contractor who provided six men to help unload figured he saved $7 per load when the block producer adopted mechanical unloading, according to Mr. Kogel. Less breakage of units and fewer employe injuries also result.

Mr. Kogel described the types of mechanical block unloaders and illustrated their uses by slides and motion pictures. The three types are fork, overhead and dump. Each has its particular advantage, though the fork truck in most cases is probably the least flexible.

Ross H. Bryan, Bryan and Dozier, Nashville, Tenn., described some of the prestressed members his firm of consulting engineers has designed for structural frames, floors and roof of buildings. In contrast to usage only two years ago, prestressed members now use bonded strands and plant fabrication, resulting in fixed cost of production. The principal advantage of plant fabrication is that a firm quotation can be made to a contractor.

Left to right: Gust. W. Dahlbeck, New London Concrete Products Co., New London, Minn., and Ed. F. Young, Universal Atlas Cement Co., Minneapolis, Minn.

Mr. Bryan used slides to illustrate fabrication methods, the varied applications of prestressed members, and installation procedures. It is important, he said, to tie beams together lengthwise to make a continuous beam. In answer to questions from the audience, Mr. Bryan said that limestone aggregate was used in prestressed units, and that block beams cost 30 percent less than steel beams in 15 ft. and greater lengths.

The question of "What can be done to reduce the cost of laying brick" was well answered by Herbert Vincent, Cinder Block, Inc., Detroit, Mich. Twenty-five years ago the cost of producing block and the cost of laying it were the same. Now the cost of labor has doubled. The lighter and truer a block can be made, the faster it can be laid. Mr. Vincent listed suggestions a mason gave him for speeding up laying of block. Never pile block on sides. Scaffolds should be 5 ft. wide. Power saw should be nearby. Mortar should be kept in plastic condition at all times. Elevate mortar boards 18 in. above scaffold. Employ competent masons. Don't crowd them—10 ft. apart is the best distance. Warm sand and water in cold weather. Keep stored units under cover.

Properly sized and made lightweight block, the speaker said, can be placed for 5 cents cheaper each than heavy, poorly dimensioned units. Other suggestions Mr. Vincent made were to work with architects and furnish them data, to use modular coordination, to cooperate with the local bricklayers, and to keep accurate block shapes and sizes. Proper design and layout of structures is about the most important consideration, for this can make or break a job.

The speaker described Marietta Concrete Corp.'s mortarless block (size 32 x 10 x 8 in.). Anchor bolts are used. A low-cost home was designed and erected with this material, using unskilled labor. Construction was very rapid. Mr. Vincent then showed slides of palletized handling of block at a new shopping center construction project in Detroit. Slides were also shown of outstanding examples of concrete masonry construction. Stacked bond will be used more and more, he contended. Reinforcing on 8-in. stacked bonds is placed every other course (16 in.).

Thursday Session

Most of the concluding day's plant and production problems session was devoted to a problems panel, in which selected questions were answered by members of a nine-man panel. As a preliminary, however, Cedric Willson, Texas Industries, Inc., Dallas, Texas, covered fundamentals of making high quality concrete masonry units.

Mr. Willson stated the need for reviewing fundamentals of masonry production, then went over the three steps in making a block: (1) mixing

James A. Nicholson accepting candy offered by the Dutch-costumed girls at the Lithibar Co. booth

the concrete, (2) forming the unit and (3) curing the unit. Few industries have as much technical information available as does the concrete masonry industry, but many producers don't practice recommended procedures, the speaker emphasized. Until a few years ago only the step of forming the unit was highly developed, but now there is much valuable information on all three production steps.

A high quality masonry unit is defined, Mr. Willson said, as one complying with A.S.T.M. Specification C90, except that moisture content is no higher than 30 percent, and the unit has a good texture. To enable attaining such a block, the producer must have a well-graded aggregate. Even though it is unusual to find sand having enough minus 50 mesh in it, the fineness modulus should be between 2.60-3.00. The F.M. of combined

Morris Lapidus, Brooklyn, N.Y., holding a sample of a new cavity wall block he has designed

Left to right: Larry Vander Heyden, Dax Block Co., Minneapolis, Minn., and R. Pries, Wm. Moors Concrete Products Co., Fraser, Mich.

fine and coarse aggregates should be 3.50-4.00, he said. In weighing aggregates, weights should be based on moisture-free material. Coarse aggregates should all pass a ⅜-in. sieve; fine aggregates, the No. 4 sieve. Materials must be free of lime, iron and other impurities.

Lightweight aggregates, when used, must have good gradation and constant properties. It is desirable to have lightweight aggregates wet down by the manufacturer when shipping. In mixing lightweight aggregates, Mr. Willson recommended that only 46-48 cu. ft. of a 50-cu. ft. mixer be used. Mr. Willson then reviewed many of the curing points suggested during earlier sessions of the convention.

The production panel proved very popular and informative. Jay C. Ehle was moderator, and panel members included E. H. Brooke, E. W. Dienhart, Jr., G. M. Neff, O. Neil Olson, Alfred Paolella, T. G. Rogers, R. A. Utiger, Mr. Willson and P. M. Woodworth. Questions asked the panel and their answers follow.

Q. What methods are recommended for thawing frozen aggregates in railroad cars, stockpiles or bins?

A. Mr. Utiger: Cinders were received saturated, so he tried blasting in cars. It was found that blasting off 5 ft. circumference chunks worked very well. Previously it had cost $25 to unload a car by pick and shovel. By using blasting a car could be unloaded in 35-40 min.

A. Mr. Dienhart: He put a canvas cover over the car and directed hot air inside with an Airoil unit. Cost $8/hr. for oil. The canvas must be supported to prevent it from falling on the flame.

A. Mr. Ehle: There is a system of heating bins by using hot (500-600 deg. F.) oil in coils. There is no steam to condense and no pipe deterioration results.

Q. What gradation is recommended for lightweight aggregate for use in block mixes?

A. Mr. Olson: Gradation must depend on texture desired; F.M. of 3.75 for medium texture unit. Recommends 10-15 percent passing 100-mesh sieve for fine material. Sources of aggregates should be watched closely, for variations in gradation can occur suddenly.

Q. What is the best and most economical method of cleaning pallets, and how can cement build-up be prevented?

A. Mr. Rogers: He tried pallet oil, but this gave trouble, particularly since 5-6 gals. were required per day at 18 cents a gal. He decided to let pallets go uncleaned for a year, then cleaned them on a purchased machine. The surface worked very well.

Q. What type of coating has proved most effective in preventing corrosion of steel racks used with high temperature, low pressure steam curing?

A. Mr. Neff: We tried all kinds of paints but found none completely satisfactory; most were too expensive or didn't prevent corrosion. The solution was to dip racks in a pit containing used crankcase oil, then drain them. Labor cost was 40 cents a rack, and no cost for the used oil, of course. Racks are dipped three times a year. No rack preparation is necessary; the rust on already will probably make the oil stick more tenaciously.

Q. Are admixtures, such as air-entraining agentes, pozzolans, fly ash or any others commonly used in the production of lightweight block?

A. Mr. Paolella: Fly ash is the most usable admixture, for economic reasons and because of increased plasticity and lower absorption (gives a denser block). Darex (4 oz./bag) has lowered the number of cracked block, in his experience.

Q. Is the use of high early strength cement recommended? how should it be used and what are the effects?

A. Mr. Paolella: High early cement frequently costs no more than standard cements, and since it gives higher strengths during handling its use is recommended.

Q. What are the advantages and disadvantages of a unit supplying heated, humidified air to the kiln, as compared to a conventional steam boiler system when used to cure block?

Left to right: E. L. Ilsley and G. W. Kay, Basalt Rock Co., Napa, Calif., showed keen interest in one of the exhibits

A. Mr. Willson: The advantage is it will result in a saving of space. A steam boiler, however, has the advantage of a simple, well proved design.

Q. What is the maximum temperature recommended for curing block with steam, the steam to be supplied at pressure of 12 p.s.i.? What holding and steam-on periods are recommended with low pressure steam curing?

A. Mr. Woodworth: Maximum temperature should be 180-190 deg. F. The holding period should be 1½-2 hr., and the steaming period should be such as to raise the block temperature at a rate of 50-60 deg. F./hr.

Q. Is it economically feasible to cube all sizes of block?

A. Mr. Paolella: He uses metal strapping which makes practical cubing of all block; this costs 21 cents per cube for the three straps required.

A. Mr. Brooke: He cubes all block, but prefers to get away from using pallets for items that can't be picked up with an expanding fork.

Q. What methods have proved practical in clearing snow from storage yard areas?

A. Mr. Utiger: He uses a front-end loader. Tops of stockpiles are first swept off by hand, then the lanes are cleared. The loader scoop is oiled to prevent snow sticking.

Q. What is the best method of producing lintels with a texture similar to the block, using the same type aggregate for both?

A. Mr. Willson: Use the same mix as for block. Since vibration rate is different in a lintel machine, slightly less water should be used. If a hand machine having no vibration generator is used, more water should be used. It is important to go through the same curing cycle.

Q. What are some incentive pay systems, how successful have they been, how do workers and unions like them, and what effect do they have on production and absenteeism?

A. Mr. Neff: He has used an incentive pay system for seven years, and believes very much in its success. A quota is set up, and if the workers exceed this volume each receives a bonus of 25 cents per hour for the full 8 hr. worked. This method eliminates the need for close supervision. Workers like the program, and unions feel it is all right if quota is not too high. The entire crew must be paid the bonus, not just the machine operator, the speaker said, otherwise you will defeat purpose of the incentive system. The company does not operate its own trucks, but yard men (company employes, of course) are paid a premium according to length of service; this starts after one year of service. The required production rate is 4320 block per day, using an old three-block Besser machine.

A. Mr. Rogers: His company has an incentive system for truckers also. He has arrived at the amount a

truck driver can normally handle in a day; if the driver goes over this figure he gets ⅓ of the dollar amount earned over the base.

Q. What is considered a high accident frequency rate for a plant hiring 100 employes and what value does an accident prevention program have in reducing employment compensation and other insurance rates?

A. Mr. Olson: Ten lost-time accidents per year per 100 employes is considered high, four is considered good and two excellent. In Wisconsin, the insurance rate is based on the second previous year. The majority of insurance companies will give credit for a good accident record.

Q. What dispatching procedures can be recommended to help provide prompt service to customer and efficient utilization of delivery equipment?

A. Mr. Brooke: This depends considerably on the dispatcher himself. He has his dispatcher place a rubber stamp impression on each delivery ticket which reads "Another load from National Brick. The load was delivered courteously and well, or discourteously and poorly." The customer is asked to check the statement.

Q. What is the recommended operating speed of a batch mixer? can it be increased to increase capacity, and if so, how much?

A. Mr. Dienhart: Standard speed of a mixer is 20 r.p.m. Tests made on speeding this up showed that a 28-r.p.m. speed was good, and that it shortened mixing time by 1 min. (4 min. at 28 r.p.m. vs. 5-6 min. at 20 r.p.m.).

Q. How can bent plain steel pallets be straightened?

A. Mr. Olson: He suggested a method of heating pallets and putting them in a press for squeezing. This worked very well in tests. Others have used pipe reinforcing wire benders for rolling pallets, and some have sent bent pallets to commercial steel rolling firms.

The Importance of Foremen

"What's Your Washroom Rating?" was the title of a talk by Edward McFaul. He explained the importance of foremen in a plant, how employes can best be guided in their work, how to communicate with the men properly. Mr. McFaul used many stories to illustrate his suggestions and to get his points across.

Left to right: Kenneth Holligan and D. Holligan, Garfield Block and Supply Co., Garfield Heights, Ohio

Aggregates—Group Meetings

MUCH OF THE DISCUSSION of the natural aggregates meeting revolved about the data presented in N.C.M.A. Technical Report 39. The meeting chairman, Ben Wilk, Standard Building Products Co., Detroit, Mich., had reported much of the original data. In tests reported therein, the best gradation was found to be 40 percent pea gravel, 40 percent sharp sand and 20 percent fine sand, with an F.M. of 3.75. Compressive strengths on cylinders reached 3200 p.s.i. with this mix, which Mr. Wilk felt resulted from the use of three sizes of aggregate. Bin shape and moisture content will affect the degree of segregation, it was pointed out. One producer mentioned that there isn't much segregation below the No. 4 screen, but there is much more above this size. The results of tests made in summer were entirely different from tests made in winter.

Mr. Wilk told of his "snowball" test for determining the consistency of the mix. Balling a sample of concrete in the hand should wet the hand slightly, and the ball should hold together. If the ball wets the hand considerably, there is obviously too much water in the mix; conversely, if the ball falls apart, indications are there is too much fine sand included. The rule to use is—add as little water as possible, but add enough to give a workable mix. Since consistency is so important, Mr. Wilk suggested a series of tests that a producer could make, using 5 percent and 10 percent more water, and then the same percentages less than the amount of water now used in the mix. Cylinder strength tests plotted as a function of the amount of water will indicate the optimum water to add for the particular conditions.

In the report mentioned above, test yield was 32 block with the 40-40-20 mix. Yield of course will vary during the year according to the gradation of the cement, which is not always constant. The block weighed 38 lb., for a 3-core modular 8-in. unit with 1-in. thick walls and 1¼-in. center shell. The relative advantages of standard and high early cements were compared, and it was found that the strengths resulting from the use of 400-lb. standard cement could be achieved with 305-lb. high early cement. The principal advantage of the use of high early cement is that much less cement is handled over a period of time. Even though there is a price differential making high early cement more expensive, savings in freight and other handling costs make its use worth while. If aggregate gradation is poor, it was suggested that an admixture would help.

Jack Crabbs, Austin Crabbs, Inc., Davenport, Iowa, spoke up from the audience and said that he found that if the fineness modulus of the aggregate is as near perfect as possible, adding an air-entraining agent slows down production—the mix is too plastic, causing the material to stick during feeding. Mr. Wilk said that a wetting agent did not help with sand and gravel block, though it did help with lightweight block.

One producer mentioned that he uses ½-lb. Pozzolith per sack of cement. He stated that he feels it gives a tougher block. It also saves the extra freight cost for high early cement which prevails in his area. Another producer said that such an addition results in economies in his plant: he takes out 25 cents worth of cement and adds 22 cents of Pozzolith (per 100 block) to obtain comparable strengths.

During a discussion of batch vs. continuous mixing, it was stated that the difficulty with the latter method is accurate weighing of materials. If materials must be weighed, one might as well use a batch-type mixer, it was said. Most thought a batch mixer is better for a one-machine plant anyway. Tests have shown that 5-min. mixing seems to be the optimum; greater time did not help. The cycle in this test was 2 min. dry, 3 min. wet. The mixer speed was 25 r.p.m., though it was pointed out that it's the time of tumbling that counts.

Much time was spent discussing curing. The tests mentioned previously used a 2-hr. preset period in the kiln prior to admitting steam. In wintertime curing, the temperature during the preset period should be raised to 75-80 deg. F. Block are heated with steam to the point at which room moisture and block moisture content are in equilibrium (usually around 160 deg. F.). Steam should be added to raise the temperature of the block no faster than 1 deg. F./hr. Mr. Wilk reported that in his plant, steam pressure at the boiler is 10 p.s.i., though this has been reduced to 4-5 p.s.i. by the time it reaches the discharge end of an open 1¼-in. pipe in the kiln. Velocity of the steam need only be high enough for the vapor to hit the end of the kiln and bounce back. This is very important, for eddies are thus created which circulate steam to the bottom of the block. Thermocouples should be placed near the kiln ceiling on the wall, and the steam should be admitted down the middle of the kiln.

To eliminate cubes of block from freezing to the ground, one producer

placed 2 in. of straw on the ground. This does stain the bottom row of block, so another producer said that he uses meat freezer paper between the frozen ground and the block. Still another uses the paper in which bundles of Masonite are wrapped. Because masons won't lay frozen block, one producer says he just leaves the frozen layer on the ground and takes off the block above this.

Waylite

Lawrence Condrey, Chicago Heights, Ill., was chairman of the Waylite meeting which had Paul Woodworth as featured speaker. Mr. Woodworth said that production of Waylite aggregate would be increased in 1953, due in part to the fact that steel production was halted for two months in 1952 due to strikes.

Annual capacity of Waylite is now about 1,200,000 cu. yd. of which some 85 percent is used for concrete units.

The Waylite Co. has launched into an expanded advertising program, promoting Waylite masonry units, which Mr. Woodworth discussed. Advertisements will be run in *House & Home* magazine, *Engineering News-Record* and *Progressive Architecture*. An audience in excess of 1 million will be reached through national magazine advertising in 1953. Waylite will also be represented in Sweets Architectural Catalogue which reaches 16,000 architects. Two booklets on Waylite masonry were distributed as representative of the types of published material being put out to promote sales.

The Waylite Co. has signed a contract with U.S. Steel Co. to establish a new plant at Youngstown, Ohio.

Other items discussed were the weights of aggregates, mixing methods, sound absorptive properties, etc.

Cedric Willson, Texas Industries, Inc., Dallas, Texas, presided for the expanded shale aggregate meeting.

After comments on the properties desired in a lightweight aggregate for load-bearing concrete, E. A. Peterson, Rocklite Products, Ventura, Calif., described the product his company manufactures and job applications. Some 50,000 cu. yd. of Rocklite were supplied for the construction of the spectacular new Statler hotel in Los Angeles, Calif. On that job, and other key ones, a 5¾-sack mix with 6 gal. of water per cu. yd. yielded a 3000 p.s.i. concrete. On the Statler hotel job, 15 percent of the dead weight of the steel structure was saved and one-third the normal weight of the concrete, the total dead weight saved being 37,500 tons as a result of using lightweight concrete. The insulation value of this concrete is about five times greater than that for natural aggregate concrete. Delivered price is $6.50 per cu. yd. within a 75-mile radius from the plant.

Practice in making concrete units is to introduce ⅔ to ¾ of the total mixing water into the mixer with the aggregate, mix for a minimum of 4 min., then introduce the cement and mix as long as practicable. Segregated sizes are preferred.

Pumice

Otto Buehner, Buehner Cinder Block Co., presided at the pumice aggregate group meeting on Monday, January 26. Mr. Buehner suggested that a consensus of opinion should be found on the problems which should be considered for discussion. It was decided to discuss the problems of shrinkage and also give a resume of the last meeting on research progress. A description was given of the cycle of moisture movement and shrinkage. It was pointed out that it is much more active with lightweight aggregates than it is with heavy aggregates. Pumice does not dry readily as it has a tendency to hang on to water. Horizontal reinforcing is the most effective way of controlling effects of shrinkage.

On the question of the effect of the fine aggregate on shrinkage, many report no ill effects, but in other sections they are washing out the pumice fines and replacing them with sand. The trouble is principally due to the presence of clay with some of the fine pumice aggregate. To control shrinkage, producers were urged to manufacture block which will meet A.S.T.M. specifications calling for a moisture content not to exceed 40 percent of the maximum absorption capacity. However, the Corps of Engineers is now requiring 30 moisture content, and producers must give serious consideration to a lower moisture content in their product. One producer uses up to 30 percent sand as a replacement for fines and has found this practice helpful in reducing shrinkage. On the question of fineness modulus, one producer found that 2.5 F.M. was not satisfactory but 3.0 to 3.5 F.M. gave better results. Discussion developed that there is some shrinkage in all concrete masonry walls, and that controlled joint reinforcement is essential. The cost in Michigan is about $1 per lin. ft. of joint for reinforcing placed at 24-ft. intervals. In Detroit, dehydrated cork is used for control joints. Another joint used is a copper V-strip fitted into the groove. The presence of pozzolans in the mix is an advantage in high-pressure curing as they combine with the free lime. Present at the meeting were 25 users and four producers.

Celocrete

Tom Cousins, of the Celotex Co., presided at the Tuesday afternoon meeting of this group. Mr. Cousins reported a possibility of increased production but the production goals would be dependent on whether no strikes occurred in the steel and coal industries. He anticipated about 20 percent more production. On the question of fire ratings for Celocrete block, the Board of Fire Underwriters has made the following recommendations

Left to right: M. W. Ferguson and L. Vaughan, Preshrunk Masonry Co., Roanoke, Va.

for block of various shell thicknesses: 1¼ in., D2 rating; 1½ in., C3 rating; 1¾ in., B4 rating. Block with cores filled with Celocrete have a B4 rating. As only "slush" slag is used for Celocrete manufacture, there is no iron to contend with. The problem of volume change due to moisture affinity of slag is a subject which is being given laboratory study. It was pointed out that sufficient emphasis was not being given to the accoustical properties of Celocrete block, particularly for school purposes.

Fred Reinhold of Anchor Concrete Products Co., Buffalo, N.Y., told about his company's methods of meeting the problem of shrinkage. He said that the New York specifications now call for a 30 percent moisture content, and producers bidding for state work must meet this limitation. Producers are policing themselves to see that only acceptable block are produced for this work. Mr. Reinhold said that the most hazardous time for reduction of moisture content was from November 1 to June 1. He urged all producers before shipping to dry all block by artificially heating and forced circulation of air with proper venting, particularly for block used in schools, hospitals, etc. Cracking has largely disappeared with the reduction of moisture to 30 percent. High-pressure curing in 12 hr. reduces moisture to less than 30 percent and gives 28-day strength. In the discussion that followed, it developed that larger inventories were needed to deliver dry block. The cost of drying in Mr. Reinhold's plant is about .6 cent per block. Fly ash is being used by some companies to cut down volume change shrinkage. Producers are also adding sand in some cases to bring up compressive strength to 1000 lb.

Cinders

C. A. Brooke presided in the temporary absence of Sam Paturzo at the cinder aggregate group meeting on Wednesday afternoon. A discussion panel invited questions from the floor. The inequitable freight rate

(Continued on page 173)

6. A producer views the ready-mixed concrete business . . . .

Selecting and Handling AGGREGATES

By JAMES A. NICHOLSON

Segregation of aggregate, particularly in the larger sizes, should be carefully watched. Stone ladders are sometimes helpful

SLIGHTLY MORE than 20 percent of well proportioned concrete is made up of cement, water and air; aggregates comprise slightly less than 80 percent of such concrete. It is very important that only aggregates be used that will make good or suitable concrete. The size, shape, gradation and structure of the aggregate are important factors in determining the quality of the hardened concrete. The size and gradation of the aggregate join with water in determining the strength of the concrete. The size, shape and gradation of the materials affect the concrete's workability. Under certain conditions, the presence of impurities in the aggregates, together with other undesired characteristics (e.g. high absorption) will destructively affect the durability of the concrete.

As a minimum, aggregates must conform to A.S.T.M. specifications, as amended to meet local conditions. In areas where thoroughly-sound, extremely well-graded, unusually clean aggregates are readily available, local job specifications are apt to be most rugged. In areas where only marginal aggregates are available, leniency, based on local service records, will be the rule. On federal and state work, in spite of what local conditions may prevail, the specifications are almost certain to be on the tough side.

Eliminate Unsound Materials

Many aggregates, in spite of their faulty mineral structure, are used solely because they are most available in their local markets. As a rule, little can be done about the mineral structure of materials. In some operations, coal, lignite, ocher and other soft and friable particles have been largely eliminated. Sink and float methods, based on differences in specific gravity offer great hope in the more economical separation of unsound material. Such processes, developed in the ore industry, give promise that many aggregate fields, heretofore considered unsafe for concrete use, can be economically operated to make available many additional millions of tons of sound concrete material.

Also, through the use of air entrainment, many aggregates which had poor service records in regular concrete, have actually performed most creditably in air entrained concrete.

We know that unsound material can cause damage if present in either the fine or coarse aggregate. We observe that concrete "pop-outs" are frequently a result of excessive expansions, inherent in the unsound aggregate found at the base of the "pop-out". We also know that not all of the excessive expansion in concrete is due to the presence of unsound aggregate. In many cases of excessive expansion, damage has resulted from a chemical reaction between certain ingredients in the aggregate and certain ingredients in the cement, (high alkali content). This type of expansion is commonly identified as a "cement—alkali—aggregates" reaction. Some sands will fail when used with certain cements or with certain coarse aggregates, yet perform creditably when used with other combinations. Similarly, some cements and coarse aggregates, bad actors under certain conditions, when incorporated with the proper combinations, have produced sound, durable concrete.

Through the use of the "sink and float" method in making possible an economic separation of harmful material from sound aggregate; through the intelligent combination of otherwise possibly dangerous materials and taking advantage of the beneficial effects of air entrainment, which undoubtedly causes some bad actors to become good performers,—through these processes and developments, a better, more sound and more durable concrete should materialize.

In the past, to predict their acceptability as sound material, aggregates have been subjected to such tests as silt and organic matter; absorption; resistance to abrasion; Kaolin, shale, chert and soft particle content; strength-ratio as measured in mortar (sand); accelerated soundness by sodium and magnesium sulphate; or cycles of freezing and thawing.

In the future, to determine their qualities as concrete ingredients, tests on aggregates will necessarily be based on their performance in concrete. C. E. Wuerpel has well said, "The most reliable test of an aggregate's ability to perform in concrete, is a test in concrete".

Proper Gradation Important

All aggregates used in concrete should be well graded from the smallest particle of the sand, to the top-size of the coarse aggregate. Sand (or fine aggregate) is the material that passes a No. 4 sieve; coarse aggregate is the material that is retained on a No. 4 sieve. To obtain higher strength concrete, more coarse aggregate, containing larger top-size particles, is used. To provide added workability, a larger portion of well graded sand is required and the use of a smaller top-size coarse aggregate might be considered.

The gradation of any aggregate is determined by a sieve analysis test. A series of sieves are used in working out the grading. Sieves contain openings ranging from the largest specified size to the smallest. The gradation specification requires that a given percentage of the material, within reasonable limits, pass or be retained, on each of the sieves.

In determining the gradation of fine aggregate, the standard sieves, regularly used, are numbers 4, 8, 16, 30, 50 and 100. In judging coarse aggregate gradation, the sieve sizes specified for use are 6-in., 3-in., 1½-in., ¾-in., ⅜-in., and No. 4. As we all know, the size of the square openings of these sieves, in consecutive sizes, are all related by a constant ratio. Members of the ready-mixed concrete industry are generally concerned only with the 1½-in. screen down.

Together with the shape and surface texture of the aggregate particles, gradation, in a given volume of materials, controls the total number of pieces, total surface area, and the amount of voids. In concrete, these same governing influences determine to a great extent the yield, workability, durability and strength.

The sieve analysis furnished the

foundation for Duff Abram's conception of Fineness Modulus, which is regularly used as a measure of gradation, particle size, and distribution of fine and coarse aggregate.

A.S.T.M. defines Fineness Modulus as "... an empirical factor obtained by adding the total percentage of a sample of aggregate retained on each of a specified series of sieves and dividing the sum by 100". The selected sieves are No. 100, No. 50, No. 30, No. 16, No. 8, No. 4, ⅜ in., ¾ in., 1½ in. and larger, increasing in each step by the ratio of 2 to 1.

The Fineness Modulus does not reveal unnatural or queer gradings, such as gaps or skips, in distribution of sizes. However, with normal continuous gradations, the Fineness Modulus is a practical means of establishing such important factors in concrete as correct combinations of fine and coarse aggregates, proper mix design for desired consistency, limits of maximum permissible aggregate size, water requirement for a given slump and anticipated strength of hardened concrete. Recently, the application of the Fineness Modulus index has been extended to include cement. Fineness Modulus will be given consideration in our discussion of Concrete Mix Design.

It has been previously mentioned that, "A ready mixed operator should always select the most sound, best-graded aggregates economically available in his local market." An operator who can purchase specification material on a fair competitive basis is foolish to use either unsound or poorly graded aggregates in processing concrete. Likewise, it is foolhardy to so carelessly handle materials that the aggregates which finally go into the mixer actually do not meet specifications. Good grading and careful removal of impurities at the processing plant can be ruined by improper handling at the ready-mixed concrete operation.

In a large measure, the future of this industry rests upon the quality of the aggregates that are processed for use in concrete, and on the efficiency of operating personnel in storing, elevating and batching these materials.

Selecting Aggregate

You should select aggregate, locally obtainable (or from a nearby dependable supply) that possesses the most desirable and the fewest undesirable characteristics. That aggregate should be made up of clean, uncoated, properly shaped particles of sound, durable material. The aggregate should be well graded and of proper sizing. The aggregate should meet regular specifications on absorption, soft particle limitation, abrasion and accelerated soundness. The material selected should contain a minimum amount of any contaminating particles that might adversely affect the appearance of the concrete or contribute to its deterioration. When used in concrete, the aggregate should be capable of resisting such physical and chemical changes as cracking, swelling, softening or chemical alteration. The aggregate, in proper proportioning of fine and coarse, should combine with the cement and other ingredients to produce an economical, durable concrete of required strength and workability.

Aggregates are unfit for use in concrete when they are unsound, of improper gradation or contain impurities in harmful amounts.

The presence of such materials as coal, lignite, humus (and other organic matter) is objectionable, and some cherts and certain shales are to be avoided mainly because they are inherently weak. Their effect on concrete is generally local in nature—simply a breaking down—causing such problems as pitting and streaking.

If the combined aggregates are improperly graded, the fresh concrete will not be homogeneous and workable; the hardened concrete will not be of required strength, uniform compaction and durability.

Some materials are unsound in that they tend to deteriorate through saturation, alternate wetting and drying, and severe temperature changes. Particles which contain small pores and channel ways, readily absorb water; this, in cycles of freezing and thawing, develops tensions in the freezing zone that adversely affect the durability of the concrete.

Other aggregates react unfavorably with alkali constituents of cement. Some opal-bearing cherts and other material may be the principal villains in producing such excessive expansion as to cause even complete disintegration of the concrete. In this type of expansion, there is almost always a form of growth (silica gel), generally produced by the reaction of alkali constituents of the cement with certain types of silicates in the aggregate.

In some eastern states, where unsound chert is present in certain aggregate, the excessive expansion that develops is largely a result of physical action. When incorporated into concrete, this chert may contain considerable moisture. If absorptive material in a saturated condition is used in concrete, exposure to freezing and thawing will generally cause trouble. If such material is thoroughly dried out before its use as a concrete aggregate, there is little likelihood of any difficulty. In fact, such dried out material may help to get rid of some excess water in the hardening concrete.

Excessive expansion of concrete may be attributable to a physical action, to a chemical action, or to a combination of both of them.

The degree of exposure, faced by concrete containing inherently weak aggregate particles, is most important. When 100 deg. weather and extreme cold fronts are regular seasonal dosages, disintegration is apt to be more noticeable. If temperatures, the year around, are fairly even, not too much trouble is expected from this source.

Certain contaminating particles appear in aggregates as coating or encrustations. At the time of processing, some of this undesirable material can be removed by a tumbling action treatment followed by screening and washing. Other unsound aggregate can be economically removed by simply handpicking, screening or washing methods. The presence of soft particles are headache" producing. Some of these particles are undoubtedly sound; others are not. Mud-balls and loosely consolidated conglomerates can be held within satisfactory limits by logwashers and scrubbers. Certain harder material can be removed by impact crushing and similar operations. Unfortunately, not all unsound material can be economically eliminated.

To closely control "pop-outs", pitting and unsightly staining, specifications should hold the amount of unsound and deleterious particles within safe limits. Specifications should forbid troublesome combinations of reactive materials. Thin and friable particles that are basically sound, together with flat and elongated pieces, that will require added sand to get desired workability, are not deleterious aggregate. Such particles should not be included in specification percentages limiting the amounts of unsound material.

Whatever fine or coarse aggregates are decided upon their acceptability will be determined by conformance with A.S.T.M. standards as amend-

Standard Methods of Sampling and Testing of Fine and Coarse Aggregates for use in Concrete*

Serial Designation	Title	Page No.
C 131-47	Abrasion of Coarse Aggregate by use of the Los Angeles Machine	740
D 289-46	Abrasion of Graded Coarse Aggregate by use of the Deval Machine	744
D 2-33	Abrasion of Rock by use of the Deval Machine	747
C 127-42	Specific Gravity and Absorption of Coarse Aggregate	782
C 128-42	Specific Gravity and Absorption of Fine Aggregate	784
C 142-39	Clay Lumps in Aggregates	750
C 123-44	Coal and Lignite in Sand	752
C 117-49	Amount and Material Finer than No. 200 Sieve in Aggregates	748
C 87-47	Measuring Mortar Making Properties of Fine Aggregate	754
C 40-48	Organic Impurities in Sands for Concrete	757
D 75-48	Sampling Stone, Slag, Gravel, Sand, and Stone Block for use as Highway Materials	758
C 136-46	Sieve Analysis of Fine and Coarse Aggregates	763
C 235-49T	Soft Particles in Coarse Aggregates	774
C 88-46T	Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate	776
C 70-47	Surface Moisture in Fine Aggregate	786
D 3-18	Toughness of Rock	788
C 29-42	Unit Weight of Aggregate	790
C 30-37	Voids in Aggregate for Concrete	792

*American Society for Testing Materials Standards 1949, Part 3.

ed by local, state or federal engineering practices.

Pattern Specification to the Job

A specification, whether it comes from a struggling architect in your home town or from the Corps of Engineers, should be practicable. A general all-coverage specification should be kept quite broad. Any job specification should be specially prepared for the market in which construction is to take place. Individual requirements should be gauged to the local conditions. Most certainly, if the tests in concrete are satisfactory, the testing engineer and the specification writer should refrain from rejecting the use of an aggregate where objection is based on an arbitrary requirement.

We recall one such experience. On a certain job, the testing engineer forbade the use of slag containing over 3 percent of glassy substances. We had an independent laboratory make a series of tests that covered slag without any glassy substances to material that contained three times the forbidden percent. The tests showed no recognizable strength differences between the slag concrete containing 9 percent glassy material and that without any glass content. The tests clearly proved that there was no foundation for the engineer's arbitrary requirement. It would be just as wrong to forbid the use of an aggregate solely because it was slightly over the absorptive limit when the material passed all other tests satisfactorily.

For use as fine aggregate, the ready-mixed concrete operator has his choice of natural sand or of sand prepared from limestone, blast furnace slag, gravel or other approved inert material. For all around customer acceptance, a good natural sand is preferred.

The sand that you use should be clean, free from silt and organic matter. Sand particles should be sharp, sound, hard and durable.

An operator faced with either excessive amounts of extreme fines or the possible presence of organic matter, should make frequent color and silt tests.

In the coloration test, a properly prepared sample of sand is taken. The sand is poured into a 12-oz. prescription bottle up to the 4½-oz. mark. A 3 percent solution of caustic soda, (sodium hydroxide), is added, bringing the bottle's contents up to the 7-oz. mark. The bottle is thoroughly shaken, then allowed to stand for 24 hours.

After 24 hours, the solution is studied. If the solution is practically colorless, the sand is free of organic matter. A straw color indicates the presence of some vegetable matter but limited in amount so as not to be objectionable. Anything darker in color indicates the possible presence of organic matter in harmful quantities.

In case the sand shows a darker color test than standard, it will be subjected to strength ratio determinations such as the A.S.T.M. test for Measuring Mortar Making Properties (as locally applied) of Fine Aggregate.

Covered storage of sized aggregates helps to prevent contamination and controls moisture content

In the silt test, a glass jar is partially filled with sand. Water is added until several inches of water covers the sand. The container is vigorously shaken, with the last few shakes in a lateral direction to level off the sand. At the end of an hour, the sand is studied to see if any extremely fine material is deposited in a layer above the sand. If the silt is more than ⅛ in. thick, your sand contains too much fine material. Such sand in storage should be blended with more coarse sand.

Whatever sand you select should be well graded, from the 100-sieve size, on the fine side, to the ⅜-in. size, on the coarse side. Minimum grading required is the A.S.T.M. specification which is quite wide open. In the A.S.T.M. specification, additional provision for uniform grading is stated in the section limiting the variation in fineness modulus to a plus or minus 0.20.

A.S.T.M. Fine Aggregate Grading Specification

Sieve	Percentage Passing
⅜ in.	100
No. 4	95 to 100
No. 16	45 to 80
No. 50	10 to 30
No. 100	2 to 10

In a more demanding specification, the following requirements might prevail.

Sieve	Percentage Passing
No. 4	95 to 100
No. 8	80 to 90
No. 16	60 to 80
No. 30	30 to 60
No. 50	12 to 30
No. 100	3 to 10

F.M.'s of Sands

Fine	Medium	Coarse
2.0 to 2.5	2.5 to 3.0	3.0 to 3.6

It is good thinking to avoid the use of sand that is very fine, very coarse or that has a large excess or deficiency in any size fraction. Sand having a smooth grading curve is preferable. A coarser sand might be used if composed of smooth rounded particles. When stone, gravel or slag are crushed to make sand, angular particles with rough surfaces are generally obtained. In using manufactured sand, you need a greater proportion of fines (to overcome the increased frictional coefficient) than when you use a natural sand (rounded shapes). In angular-shaped sand, a small addition of water, cement and air is usually needed to obtain workability.

The tendency on important work is to require closer control of gradation with somewhat higher limits on the fine side and with Fineness Modulus variations held within closer limits. Since the advent of air entrainment, fines in the 30- to 50-sieve classification have become an important consideration. The presence of a consistent percentage of fines in this classification, aids the ready-mixed concrete producer to control entrained air within close limits.

If the sand is poorly graded, consider these remedial steps:

1. Provide facilities to store and weigh other sized aggregate required to overcome gradation deficiency.
2. Blend aggregates in a ground pile to secure a good grading curve.
3. Use fly ash, dispersing agent or other admixture to relieve deficiency.
4. Entrain air to overcome harshness, bleeding or segregation.

As in the case of sand, the size, shape and gradation of coarse aggregate are very important. In concrete sand, the same sizing and gradation generally hold throughout its use in concrete. In the case of coarse aggregate, changes in gradation and sizing are made on the basis of the intended use in concrete.

(To be continued)

Quality Concrete School

Short course in quality concrete at Georgia Tech drew attendance from 12 states to discuss the latest advances in concrete design, curing and mixing practices

A SHORT COURSE in quality concrete was held on February 2, 3 and 4 by the School of Civil Engineering at Georgia Tech. This is the third successive year that the short course has been offered at Tech. Registration was 196. Most of the attendance was from Georgia and the bordering states: Georgia, 106; Florida, 30; Alabama, 19; South Carolina, 13; Tennessee, 10; Virginia, 5; Washington D.C., 3; North Carolina, 13; Illinois, 2; and one each from Pennsylvania, New York, Louisiana and Mississippi.

Prestressed Concrete

After the welcoming speech by Col. Blake R. Van Leer, president of Georgia Tech, the first session began with Professor Robert E. Stiemke, director of the School of Civil Engineering, presiding.

The first session was devoted to prestressed concrete. "The Basic Principles of Prestressed Concrete" was the subject of a talk presented by Dr. Harry C. Saxe, professor of civil engineering. Dr. Saxe gave a short history of prestressed concrete, and presented a series of diagrams illustrating the stress patterns of a concrete beam with prestressing as compared to a beam without prestressing. Especially emphasized was the misuse of the term prestressed which should be called pre-compressed.

J. G. Stokes of the Portland Cement Association gave a demonstration of the principles of prestressed concrete by use of a beam composed of a series of wooden blocks. The beam was loaded and the deflections measured, then the beam was prestressed and the loads applied and deflections taken, thus illustrating the advantages of prestressing. Mr. Stokes showed that the downward deflection of a prestressed beam does not necessarily mean tension stresses in the bottom.

"Factors Influencing the Design of Prestressed Concrete" was the topic of the lecture by Ross H. Bryan of Bryan and Dozier, consulting engineers. Mr. Bryan emphasized economy as a prime consideration in the use of prestressed concrete. The use of prestressed concrete can save up to one-half the concrete required and three-fourths the steel for the same load as a conventional beam. Notwithstanding the economic considerations, other properties in favor of prestressed concrete were increased durability, reduced diagonal tension, crack-free concrete, and adequate warning given when the member is overloaded. Mr. Bryan showed a series of lantern slides illustrating the stress-strain

D. L. Chaney demonstrating the design of concrete mixtures

Left to right: Stanton Walker, director of engineering, National Sand and Gravel Association, and D. L. Chaney, regional structural engineer, Portland Cement Association, Atlanta, Ga.

relationships of several prestressed concrete beams, and pictures of these members being constructed and loaded.

"Manufacture and Use of Prestressed Concrete Beams" was the subject discussed by Henry Dougherty, engineer for the P.C.A.

This talk mainly concerned the use of concrete block as used in prestressed concrete beams. A movie depicted the manufacture and erection of these beams. Several bridges and stadiums built in Tennessee by this method were shown in construction stages, giving an idea of the versatility of concrete block-prestressed beams. The block are laid out on a special table for alignment and prestressing. The beams are lifted off the table by specially-made hooks and loaded onto trucks. These trucks deliver directly to the job where a crane removes the block-beams and places them where needed. A truck-mounted crane has proven the best type to use.

Concrete Mixtures

"Design of Concrete Mixtures" was the topic of a talk given by D. L. Chaney, region structural engineer, P.C.A. He described the quality desired in concrete-strength, water tightness, durability, and told about the factors which affect quality, and how to design concrete—taking into consideration the factors needed to produce the qualities desired. Mr. Chaney had slides showing variation of water content, the effect of curing, and the effect of w/c ratio on permeability.

Left to right: Radnar J. Paquette, professor at Georgia Tech., who was largely responsible for organizing the conference, and K. P. Billner, president of the Vacuum Concrete Co., Inc., Philadelphia, Penn.

An interesting point in Mr. Chaney's talk was that slump is no indication of strength; i.e., a watery mix may be stronger than a no-slump mix. He discussed the cause of slump and how to obtain the desired amount of slump.

Mr. Chaney climaxed his talk with a demonstration. He prepared an actual mix using $\frac{1}{4}$ proportions. He went slowly through the mix and design procedure. He was trying to obtain a 4-in. slump. In obtaining it, he demonstrated the result of adding coarse and fine aggregates to the mix. The slump obtained was 3½ in.

Stanton Walker, director of engineering for the National Sand and Gravel Association, spoke on the "Practical Application and Control of Concrete Mixtures." Most of Mr. Walker's talk was from the viewpoint of ready-mixed concrete producers and the troubles involved when too many specifications are given. Mr. Walker also spoke in favor of standardized procedures in sample specimen construction and curing rather than an attempt to imitate field conditions.

Concrete Block

Carl A. Menzel presented a short talk on the A.S.T.M. and federal specifications as applied to concrete masonry units. Discussion also included the properties of concrete which may be required on all types of work.

Mr. Menzel told of his experience 25 years ago, when they had no specifications, and the progress made up to the present time. He reminded the group that two-thirds of all wall area today is of concrete block. He also spoke of the reasons for having specifications, and most important of all, emphasized the adherance to those specifications.

A new test for moisture content was described which could have results in less than an hour—against 72 hours for the old methods. Also, the test could be made by the manufacturer himself, rather than sending the sample to the testing laboratory.

Mr. Menzel told about a new sulfur cap used for testing which could be ready 15 minutes after capping. This cap has been used at Richmond, Va., with favorable results.

Harry McDonald described the proper steps in mix design which would produce an ideal concrete mix. In describing an ideal concrete mix, he said, "The closer you can approach a slump, without slump, the better block you will have."

Mr. McDonald went through a typical problem in design by fineness modulus of aggregate—showing shortcuts in computation and theory which speed up the design of a batch, but produce accurate enough results for all jobs. He stated that he used the "nominal mix" method of design, which was not as technical as the "true mix" method.

One of the questions which arose was the swelling of a concrete block when wetted. Mr. McDonald discussed the results in all possible cases, including poor mixes.

A forty minute film, "Concrete Mix Design" by Portland Cement Association, was shown Tuesday morning, which explained the steps in the design and mix of a trial batch of concrete. It described the four ingredients of concrete, the proper proportions used for each batch, and how the design and mixing of good concrete in the field could be accomplished. Air entrainment in concrete was described, as well as the precautions which must be taken on the job. The three main items necessary for quality concrete are: optimum water-cement ratio, clean, sound material, and correct mix proportions.

Laboratory Preparation

Prof. J. H. Lucas of Georgia Tech presided at these meetings, which were held in the highway materials laboratory of the Civil Engineering Building. S. E. Hyde, Jr., Cumberland Portland Cement Co., S. R. Millhouse, Universal Atlas Cement Co., and John E. McNally, Protex Co., organized and supervised these sessions.

After seeing the movie on concrete mix design, the men were divided into four groups. Each group was then divided. Group 1 designed and made concrete for the footings of a building. One part of the group used ordinary concrete; the other part used an entraining agent. The men could use any mix they desired. Groups 2 and 3 were basically the same set-up, with some using air entraining agents, and some not. However, group 2 made concrete designed for concrete piles to be subjected to salt water action. Group 3 designed and mixed concrete for the structional part of a building. Group 4 ran various tests on fine aggregates.

The afternoon session was a continuation of the morning session, with the groups exchanging jobs.

One test cylinder for each trial batch designed was made up and placed in the curing room. Along with each cylinder went the names and addresses of each man in the crew. When the cylinders are broken (in 28 days), each man will be sent the results of the test. They can then refer to their notes to compare the design with the results.

Masonry and Mortars

C. E. Wuerpel, technical director of Marquette Cement Manufacturing Co., lectured on masonry cement and mortars.

Mr. Wuerpel brought out very strongly the fact that the failure of a brick building is due to assemblage regardless of the strength of the mortar. The critical section is the interface between the bricks and mortar. Good mortar should have tenacity, plasticity, and water retentivity. At present our mortar specifications are rather poor. However, Mr. Wuerpel outlined future plans for research and development of mortar cement which should put it on a plane with portland cements.

A revealing item of Mr. Wuerpel's slides was the fact that expansion causes cracks in brick walls—not contraction, as is usually thought. He also showed a slide of a building where extreme expansion caused the state to pass a law.

J. C. Chunn showed slides presenting the results of tests on masonry mortars. The tests, run at the division laboratory of the United States Corps of Engineers, entailed the testing of mortar mixes using different substances as admixtures, such as limestone dust, and air-entraining agents.

Past experiences with concrete masonry construction in the Corps of Engineers was the information presented by C. F. Duncan. The main topic was the effect of moisture in masonry (i.e., swelling) and the steps used to prevent such occurrences. Mr. Duncan also presented a series of charts which described the details of construction with concrete mortars.

Dr. Boris Boguslavsky lectured along the same lines, showing slides which correlated with Mr. Duncan's talk on moisture expansion. Many of the slides showed cracking in walls and measures which should be taken to prevent this.

Part of the large number who attended banquet

Don Wendling, technical advisor for the Birmingham Slag Co.

Curing Rooms

"Planning and Building Low-Pressure, High Temperature Curing Rooms" was presented by Hugo Quillian of Quillian's Concrete. The first topic covered by Mr. Quillian was the need for a more dependable concrete block product, which includes better production conditions and control over installation.

Mr. Quillian next discussed the types of concrete block, the section of the country where each is used and the work being done to improve each type. He said that block are now being produced under conditions of low pressure, high temperature, and high humidity which are equal in quality to those produced in autoclaves.

The third topic of Mr. Quillian's talk was the planning, building, and operating of curing rooms. The factors of the planning phase are: size of batch (smaller batch, better control), and the most important—plant layout. Emphasized under the building phase were methods and materials of draining and insulation. Ease of operation depends upon simple controls.

Mr. Quillian also mentioned some of the operating kinks he had encountered. The worst was maintaining even heat and moisture distribution in the curing room. Others were: matching the process to the weather, controlling moisture content of the aggregates, and personnel education.

Discussion

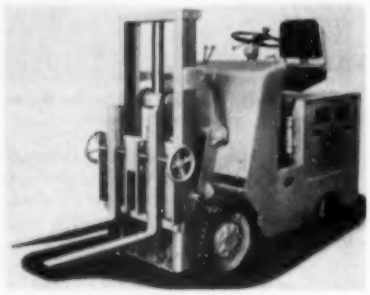
On Tuesday afternoon a round table discussion was held. The panel members were: Carl A. Menzel, C. P. Linder, C. E. Wuerpel, Boris W. Boguslavsky, D. L. Chaney and Harry McDonald. The panel endeavored to answer questions both from the floor and those read to them by Mr. Jones, which were gathered from the audience before the discussion began. Most of the questions were directed

(Continued on page 169)

NEW MACHINERY

Fork Adjustment

THE ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland, Ohio, has developed an attachment to aid



Fork truck with special device for rapid fork adjustment

positive positioning for frequent fork adjustments. The unit is called "screw adjusting forks." The device consists of a frame which attaches to the standard load elevator. This frame supports a pair of large diameter screws. The forks are supported on these screws and can be moved laterally as the screws are turned. In using this unit as a manual side shifter to facilitate picking up loads which are too close to the side of the car to permit use of conventional fork spacing, a single screw to position both forks at the same time can be supplied.

Truck Mixer

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo., has announced its Rocket truck mixer which comes in a full range of sizes. The truck features open end loading which thus eliminates a drum seal, a loading hopper which feeds the material into the drum in front of the blades, and an hydraulic chute control that automatically raises and lowers the discharge chute.

Leasing Industrial Trucks

YALE & TOWNE MANUFACTURING CO., Philadelphia Div., Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Penn., and C.I.T. Corp., subsidiary of C.I.T. Financial Corp., have announced jointly a nationwide plan for leasing industrial lift trucks, fork trucks and allied equipment on a monthly rental basis. A corollary plan is also available for users who wish to purchase Yale materials handling equipment on installment terms rather than lease.

Block Surface Treatment

MAC ISAAC AND MENKE CO., Los Angeles, Calif., recently announced the development of a sand blasting method, designed to improve color and texture of conventional concrete block. Development of the treatment was carried out during the recent construction of the Maywood plant of Consolidated-Western Steel Co., division of U.S. Steel Co. Block used in the exterior wall was composed of volcanic lava aggregate which had a slight reddish cast, grayed down by its cement binder. A light sand-blasting of the completed wall resulted in exposing the red aggregate slightly and was said to produce a new depth of color tone and richness of texture. Joints in the wall were not disturbed by the treatment. Waterproofing was applied in the form of a transparent repellent after the sand-blasting.

Block Unloader

BUILDERS EQUIPMENT CO., 4012 N. Central Ave., Phoenix, Ariz., has announced its Superlite unloader which has a 6000-lb. capacity with an extra built-in safety overload factor. The

Block unloader of 6000-lb. capacity handles two cubes at once

unit, which includes carriage complete with motor, drives, hydraulic mechanism, controls, 2-hinged extension tracks, supporting legs and lift bars, is said to be capable of unloading 12 cubes of concrete block within 20 min., or less, cutting delivery costs by as much as 50 percent of normal hauls. It can be mounted on any standard truck or trailer and can be bridged for truck to trailer operation. The unit is said to handle two cubes at once and can handle block in any size normally handled by a regular fork lift. The controls can be operated from either side and are within easy reach of the operator. In addition to block, it can also be adapted for use in unloading sacked cement, tile, barrels, drums, crates, boxes, machinery and other equipment.

Fork-Lift Truck

CLARK EQUIPMENT CO., Industrial Truck Div., 1951 Escote St., Battle Creek 80, Mich., has announced the improved Yardlift-150, pneumatic-tired fork-lift truck of 15,000 lb. capacity. A separate hydraulic system is used for the power steering. To increase the driver's vision, new fork bars are narrowed vertically and the opening between the upright channels and lift cylinders increased by 3½ in. A pivot-type steering axle is standard on the new machine.

Truck mixer with hydraulic chute control

Fork-lift truck with 15,000 lb. capacity

Concrete Short Course

(Continued from page 167)

at specific panel members. At the end of the discussion, Mr. Menzel unveiled a new apparatus for determining relative humidity of concrete block.

Lightweight Concrete

Frank G. Erskine, managing director of the Expanded Shale Institute, gave the first of two talks on lightweight aggregates. He first described the two processes used to expand shale: (a) rotary kiln method and (b) sintering method. Both of these methods use temperatures of 1700-2020 deg. F. to "bloat" the shale, the difference being in the method of charging.

Some of the advantages of expanded shale concrete are: 30 percent weight reduction with no strength loss after 40 days, good heat and sound insulation, and great economy. It may be mixed in the same way as ordinary concrete (using air-entraining agents). The tilt-up construction method utilizes its light weight with high strength property. Expanded shale concrete may also be used in pre-stressed beams.

The main disadvantage in using shale aggregates is that they absorb large amounts of water, due to voids within particles.

Don Wendling, technical advisor, Birmingham Slag Co., presented the other lightweight aggregate—expanded slag. He explained that although any iron process slag could be used, A.S.T.M. specifications require iron blast furnace slag. The type of slag is determined by the cooling method, which is essentially the mixing of water and hot slag.

Mr. Wendling pointed out that plants usually produce both coarse and fine aggregates, then mix according to requirements. He recommended that concrete utilizing expanded slag be designed on a weight basis. The usual mixing procedure is to mix the slag plus one-half the amount of water, then add cement, mix, and the remainder of the water (plus air-entraining agent). The total mixing time should be 8 to 15 min.

The advantages of expanded slag concrete are about the same as those of expanded shale. Mr. Wendling mentioned that for best acoustical properties, it should be sprayed, not hand painted. Nails may be driven into expanded slag concrete easily, and held securely.

George Nelson, of Law-Barrow-Agee Laboratories explained the design of lightweight concrete. He said that, due to lack of definite information, both weight and volumetric methods are being used to design mixes.

Mr. Nelson pointed out some of the problems involved in designing these mixes; lack of workability, variation of bulk specific gravity with variation in size of particles, variables other than strength involved, large amount of segregation with in-

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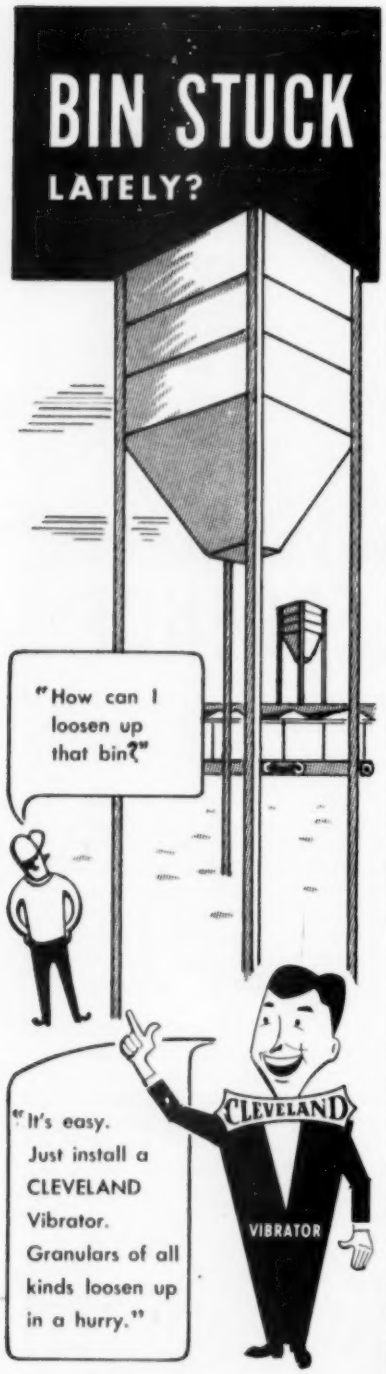
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crease in lightness, and variation of air content and water/cubic yard with bulk specific gravity.

The Goldbeck Method was used by Mr. Nelson to design a mix, placing the numerical calculations on a blackboard. Air content recommendations were also given.

Vacuum Concrete

The final session was conducted by K. P. Billner, president of Vacuum Concrete, Inc., on the subject, "Precast Vacuum Concrete Here and Abroad." Mr. Billner, who developed this method of construction, pointed out some of the features and advantages of vacuum concrete construction, then backed up his talk with a series of films and slides.

The essential feature of this method is the removal of excess water, with a vacuum, after placing in forms. The vacuum may also be used to hold forms in place and move them about on a job.

The concrete placed has a medium slump. The forms may be removed after a period of 5 to 30 min., depending on the structure. The value of the concrete obtained by this method averages 7000-8000 lb.

At one point in the films, Mr. Billner illustrated a new thin-shell arch design developed by himself.

The social highlight of the conference came on Tuesday night when a banquet was held in Brittain Dining Hall with Clinton E. Jones presiding. The speaker of the evening was Bob Bossons, assistant coach of the Georgia Tech football team.

Canadian Concrete Products Meeting

THE NATIONAL CONCRETE PRODUCTS ASSOCIATION (of Canada) held its fourth annual convention in Toronto, Ont., February 9 and 10, 1953, with approximately 125 members and guests in attendance. The association has a membership of about 200, largely concentrated in Ontario, although membership extends from Halifax to Vancouver.

Reports indicated that the Canadian concrete products industry established a high level of production and sales in 1952, with a further increase of about 12 percent predicted for 1953. The increase in sales was attributed to the improved quality of the products, resulting in greater public acceptance and architectural recognition. Reports also indicated that plant investments were rapidly increasing, with a large number of producers re-investing all profits after deduction of corporation income taxes. In this regard, a timely warning was given by Kirby L. Hannon, tax counsel, who pointed out the necessity of knowing where to charge items before buying; giving proper attention to depreciation allowances; and providing for succession duties—any of which could ruin a business if necessary provision were not made.

In a speech by Earl L. Sheppard, Royal Architectural Association, Toronto, concrete block were described as exciting plastic material, precision made, and not to be used as an imitation, but to be sold as the best product on the market for the purpose. Mr. Sheppard suggested investigating the possibility of manufacturing a strictly architectural design. His friendly criticism was that the industry had not supplied the architectural profession with proper data showing what it had to offer.

(Continued on page 172)

Garnet Fraser, president

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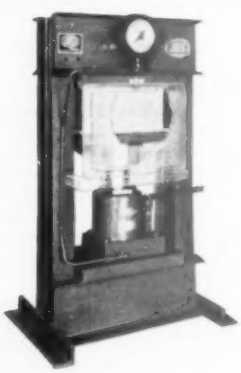

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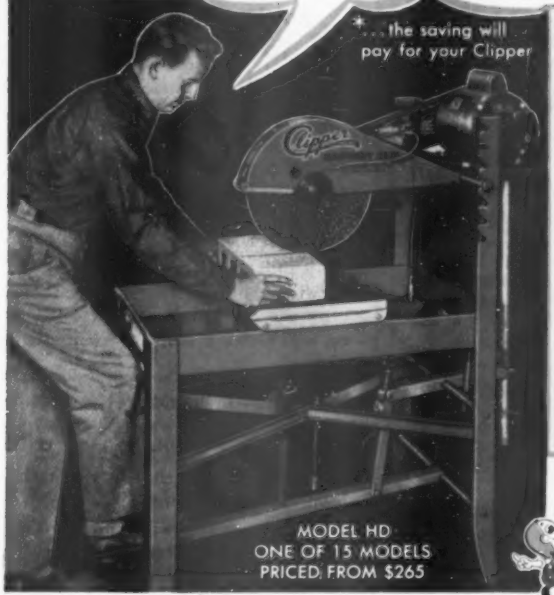

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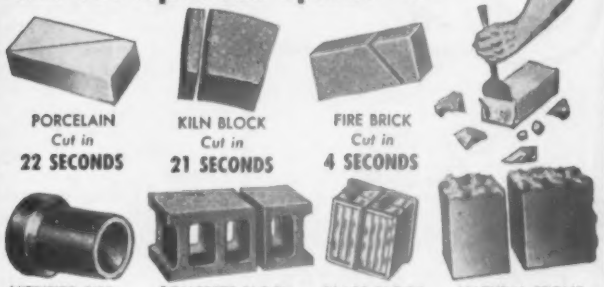

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Walter Ball, National Research Council, stressed the climatic differences in Canada and their relation to building. He stated that a "Climate Atlas of Canada" was now being developed, with a view toward more practical building as regards climatic location.

W. H. Grisenthwaite and Ronald Fraser, National Home Builders Association (Canada), representing 350 builders and 650 suppliers, discussed Canadian residential building during the past two years and the future outlook. Although house building has declined for two consecutive years, an estimated 82,000 housing units will be built in 1953, increasing to about 130,000 units in 1955. Pointing out that housing is not keeping pace with demand, they suggested that the concrete products association join a proposed allied council of housing services.

Carson Luke, Paris Dunbrik Co., Ltd., Paris, Ont., reported a continuing high increase in the market for concrete brick, both colored and plain. In 1942 the Canadian production of concrete brick was under 1,000,000 units, but increased to 48,000,000 in 1952.

Cement supply prospects for 1953 were discussed by J. M. Breen, president, Canada Cement Co., Ltd., and J. Counsell, sales manager, St. Marys Cement Co., Ltd. Mr. Breen stated that with Canada Cement Co.'s increased production and with most power development jobs being completed (subject to no unexpected defense construction contracts), there would be more cement available for concrete products plants this year. Mr. Counsell was less optimistic. Canada Cement Co.'s seven plants and St. Marys Cement Co.'s one plant produce over 90 percent of Canada's cement.

Officers elected for the 1953 term were: Garnet Fraser, Cross Supplies & Paving, Ltd., Windsor, Ont., president; John Pennachetti, Thorold Block Co., Thorold, Ont., vice-president; W. H. Kirkpatrick, H. & K. Concrete Specialties, Woodstock, Ont., second vice-president; A. D. Wylie, Economy Fuel Co., Hamilton, Ont., secretary; and Brant Coleman, J. Cooke (concrete block) Ltd., Aldershot, Ont., treasurer.

John Pennachetti, vice-president

COMMENT
from the BUTLER ENGINEER

Engineer Stripped to Underwear!

Sub-zero here today. Paradoxically it reminds me of a devilish hot day last summer. I was building a new home. So I order the first load of ready mix for my footings. Thought I had arranged for a couple of men to come out with the transit mix truck to handle the pour. My only job would be to sign the receipt — so I am in business clothes.

In comes the concrete but no men. Obviously we have to pour — right then! For the next two hours I'm busier than a chameleon on Joseph's coat. I guide the spout. I shovel concrete. I puddle it and place the reinforcing. And I do the surface finishing.

First, my coat comes off. Then my shirt. Then my pants. I end up clad only in the lower half of my unmentionables — and even then the sweat pours into the mix so fast it becomes a slurry.

Well, anyway you can't beat concrete batched in a Butler Plant and mixed with sweat from the Butler Engineer. But usually the sweat comes first — before the Plant is built.

1953 will reach a new and higher high in road construction. Think of the immensity of the Ohio Turnpike. 57 contractors on that one job alone. But compared with new highways, relocations and the like, all over the nation, the Turnpike is like an inch to an ell.

All in all, gentlemen, it's a lot of yardage — and a hell of a lot of Butler Plants.

Be seeing you — on those jobs.

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Aggregates Meetings

(Continued from page 162)

situation stimulated considerable discussion. It was suggested that action be taken before the I.C.C. to place cinders in a classification calling for a lower rate. The matter will be brought to the attention of the N.C.M.A. for action.

It was brought out that the cinder supply situation is tight. Herb Vincent of Detroit said that some slag is now being mixed with cinders to extend the supply. A Pennsylvania processor of cinders estimates a 10-year supply. There is apparently a tendency to use a larger percentage of fines. The trouble of staining and popping has been practically eliminated by storing, wetting and crushing. Pennsylvania anthracite cinders are free from properties which cause staining and pop-outs, according to one producer. On the question of batching, Sam Paturzo said that the volumetric method of batching, electrically-controlled, had been found to be most effective in his case. He did not think batching by weight was practicable.

Exhibits

Equipment exhibits were extremely interesting this year because there has been much development to cut costs, reduce handling, manufacture split-sized units, apply colors and water-proofing, etc., as contrasted to many previous expositions where the emphasis had been mainly on block machinery to produce more units per hour. The truck mixer manufacturers have been emphasizing designs to give top capacity in view of the restrictions being enforced to limit axle loads.

Descriptions of the exhibits are as follows:

Adrian Peerless, Inc.—Distributed samples of "Wal-Tok" deformed and knurled reinforcing for masonry walls, also literature.

Allied Chemical and Dye Corp.—The booth featured literature of the products of the Solvay Process Div., calcium chloride in particular.

Berg Vault Co.—Showed small models of the Berg burial vault, cutaway sections to bring out details of reinforcing and pictures showing handling of the vaults.

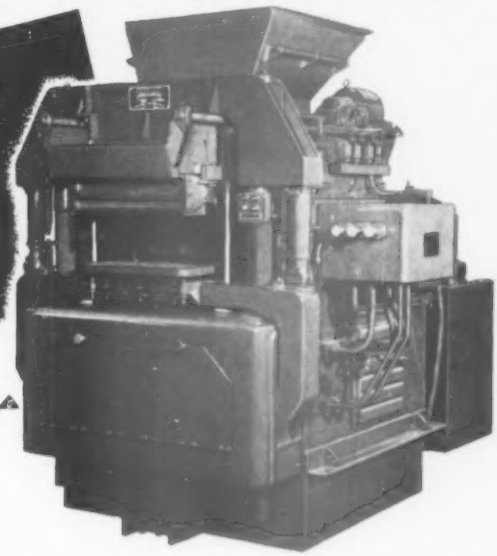
Bergen Machine and Tool Co., Inc.—Photographs of the company's machinery were on display.

Besser Mfg. Co.—This exhibit was extraordinary because it was educational in character, to show block producers the facts about shrinkage and wall cracking. On display were six of the "wallettes" under test by Toledo University as part of a concrete masonry investigation which is co-sponsored by various agencies, producers, associations and manufacturers including Besser Mfg. Co. John H. Selden, Toledo University, gave lectures and demonstrations on the

(Continued on page 176)

EXCEEDS 4 CYCLES per minute!

Columbia New, Fully-Automatic 3 BLOCK



...gives you fast, profitable production of quality blocks on a low cost basis!

Columbia's rugged construction, precision tooling, concealed parts, keep maintenance costs down and step-up production standards to a new, profitable high! Here are more reasons why Columbia's new 3-block machine gives outstanding performance: Standard Plain Pallet • Removable Plunger • Controlled Vibration • Hydraulically Operated • Manual Controls for Clean-up • Automatic Height Control • Twenty-Minute Mold Change. These and more make Columbia the leader in its field!

NATIONWIDE SALES, PARTS AND MAINTENANCE SERVICE with headquarters in the following states: Washington, California, Wisconsin, Mississippi, New Jersey, Florida, South Carolina, and Virginia. Fast service maintained to all parts of the country. Write today for additional information.

Columbia LINE MACHINES FOR THE BLOCK-MAKING INDUSTRY

- Fully automatic and manual block making machines, 2 and 3-block capacities.
- Automatic Block Splitters.
- Batch Mixers, 12, 18, 25 and 50 cubic foot sizes.

Write for information on complete Columbia line today!

Columbia MACHINE WORKS

107 SOUTH GRAND • VANCOUVER, WASH.

BUY U.S. SECURITY BONDS Now!

World's heaviest prestressed

11% savings over structural steel realized with design using Roebling Strand and Fittings

IN THE BARRETT-LICK GARAGE nearing completion in San Francisco, the plans call for a large, unobstructed space in the entrance area . . . and to achieve this, four columns from the upper stories terminate at the second floor and are carried by the heaviest prestressed concrete girders ever constructed. Prestressed concrete was chosen because it allowed adequate headroom without increasing the story height . . . and, incidentally, there was a $6,000 saving (more than 11%) over the cost estimate for an alternative structural steel design.

• • •

To meet the requirements of every prestressed concrete design, Roebling has developed a full line of products . . . Prestressed Concrete Wire and Strand for pre-tensioning . . . Strand and Fittings for post-tensioning.

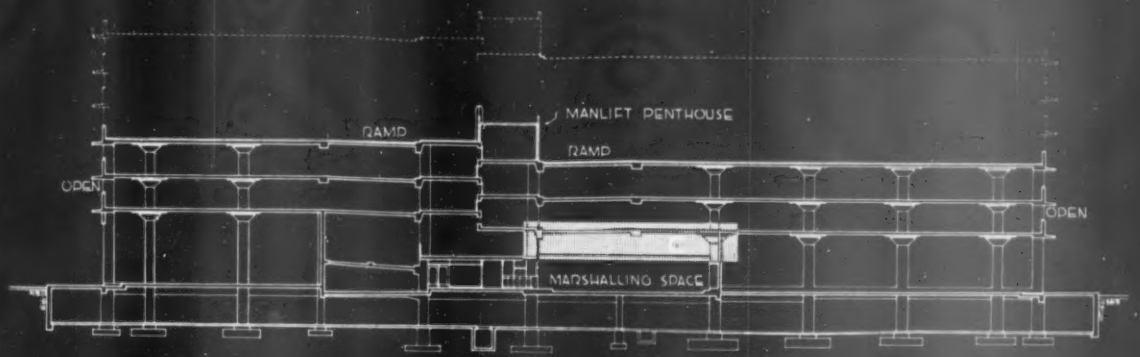
Roebling Wire and Strand for pre-tensioning are made of high tensile acid steel that results in products of high elastic characteristics. Special treating increases their bonding quality, too.

Roebling Strands for post-tensioning are fabricated from special hot galvanized acid wire, insuring extra strength and elastic properties. At recommended stresses, there is complete safety and no future relaxation of the steel. And Roebling Fittings develop the full strength of the strand without exceeding the yield point of any of their parts. They are attached at the plant and proof-loaded beyond recommended stresses.

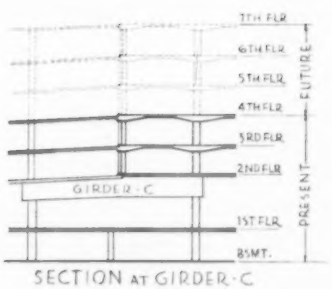
Prestressed Concrete is being more and more frequently adopted. Write for the facts and figures on Roebling Prestressing materials. Prestressed Concrete Dept., John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

A Subsidiary of The Colorado Fuel & Iron Corporation

girders for California garage



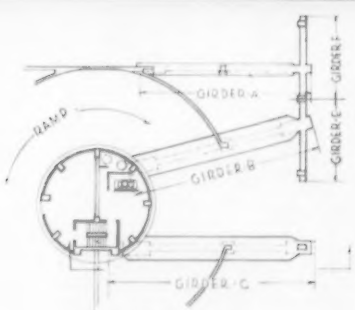
Ellison & King, Engineers • Barrett and Hilp, Contractors



SECTION AT GIRDER-C

Open, unobstructed entrance area is indicated directly below girder "C". Note that the design includes provision for three additional stories. This section shows haunched slabs used in actual construction.

Plan view of five prestressed concrete girders, showing their arrangement to meet the free area requirements of this ultra-modern garage.



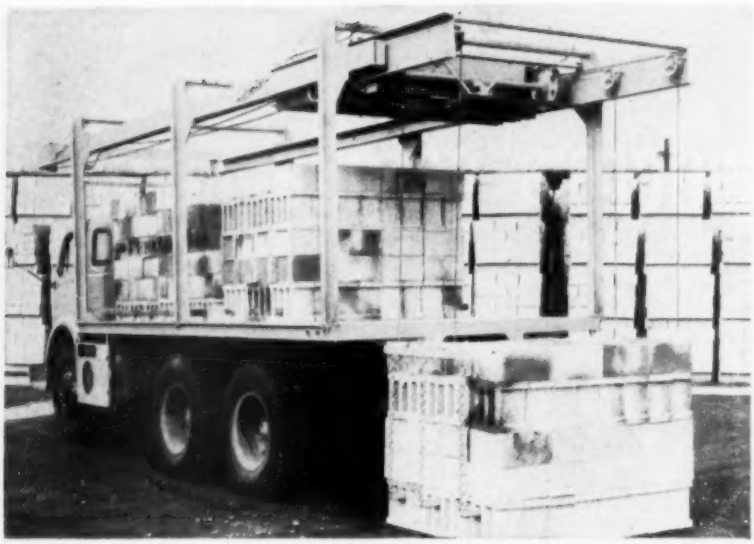
GIRDER PLAN

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST & 120 S. HEWITT ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • PITTSBURGH, 1301 CLARK BLDG • ROCHESTER, 1 FLINT ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

CF&I

JAR ROEBLING



Bros Lectro-Lift Material Handling Truck Body

You saw them at the show...

now try them in your operation

●Response to these two new products from visitors to our booth at the Concrete and Masonry Show was terrific, to say the least. Those of you who examined the Bros Lectro-Lift material handling truck body, shown above, saw how *one man* can now load, deliver, unload and stock concrete blocks, tile and other palletized or cubed materials *three times faster* than a two-man crew working manually!

Bros Block Handler

The Lectro-Lift features an electrically operated traveling carriage, equipped with handling attachments, operating on a skeleton-like structural steel heavy-duty frame. Lectro-Lift can pile high, unload below ground level, work on sloping ground. And your troubles with damaged block claims are over . . . no more broken corners or chipping with Lectro-Lift on the job! Four models available, for 12′ to 18′ truck beds.

The Bros Block Handler, shown at left, really scored a hit at the Show. It works like this: a smooth-working electrically powered hoist travels on a swinging overhead monorail. Two push buttons on the lifting column (where the man has his thumbs) control loads up to 500 lbs. . . . lifting is smooth, easy and safe. Standard two-prong fork fits any cored block. Other attachments are available. What could be simpler? . . . and you cut your operating costs in half!

WRITE FOR NEW LITERATURE: New folder and catalog sheet on these new products have just been released! Send for your copies today. Ask for Lectro-Lift and Block Handler literature.

WM. BROS BOILER & MFG. CO.

MINNEAPOLIS 14, MINNESOTA

research program in this booth and was effective in drawing an extremely interested audience. The demonstration was used to show that shrinkage cracking can be minimized or completely eliminated in several ways, among them being by (1) increasing tensile strength of the units, (2) reducing shrinkage of units and the mortar, (3) reducing restraint to shrinkage, (4) distributing and minimizing cracks, and (5) prestressing walls horizontally.

The demonstration of actual walls under test certainly brought out the advantages of high pressure steam curing, and of laying dried units in walls.

The Besser block splitter, laboratory testing apparatus, Yoder compression testing machine and literature on all its equipment were also on display.

Bickerstaff, Inc.—Display featured a full-size lift-truck fork and a model. These forks require no pallets and are automatic, with the weight of the load actuating the grippers. With this fork, concrete units can be cubed with their cells vertical and yet be handled by power equipment.

Blaw-Knox Co.—This exhibit centered about a 5½-cu. yd. "Hi-Boy" truck mixer (7⅛ cu. yd. as agitator), mounted on a Mack truck with dual rear axle (10 wheels). The mixer was equipped with the B-K Loadmaster feature with revolving hopper at the open end of the drum which permits conversion to a closed drum. Also on display were a scale model of a B-K clamshell charging aggregate bins, photographs of ready-mixed concrete plants and truck mixer fleets, and quick-opening doors for autoclaves.

Builders Equipment Co.—A full-scale "Superlite Unloader" was on display. This device is an unloading mechanism for trucks, powered either by gasoline engine or electric motor. It rolls on horizontal tracks laid along both edges of a flatbed truck and fits over two cubes of block set side by side on the truck-bed. Lift bars are passed through the cores of the bottom units in a cube, a hydraulic lift raises the cubes clear of the truck bed and the unloader, carrying two cubes, then rolls the length of the truck onto two hinged extension tracks. The cubes are then lowered to the ground, the lift bars are withdrawn and inserted into the cores for the next cubes. The truck moves forward six feet to give clearance for stacking.

L. Burmeister Co.—A scale model batching plant was exhibited featuring SuPremix tilt-up central mixers as used in a complete packaged plant for ready-mixed concrete. Pictures of the controls used to regulate batching were also shown and literature was available describing the company's line of batching plants, bins, screen conveyors and belt conveyors.

The tilt-up feature was developed

to reduce head-room and yet provide a steep discharge angle.

The Burns and Russell Co.—The booth was built with a wall panel of Spectra-Glaze block, emphasizing the smooth colored faces and exposed joints. This is a heat-treated product which consists of a tile face cast directly on a block to make an integral load-bearing masonry unit. Sample units, of various textures and smooth surfaces, in various colors, were also on display.

Butler Bin Co.—Exhibited pictures and literature on bins and batchers.

Calcium Chloride Institute—Literature and charts were available at the booth showing the applications and results when calcium chloride is used for the manufacture of concrete block, pipe, burial vaults, etc., and in paving construction.

Cedar Rapids Block Co.—Pictures were shown of Dur-o-wall masonry joint reinforcing in various applications. An actual wall was laid up in the exhibit with cutaway sections to show how horizontal reinforcing is applied. Dur-o-wall reinforcing is used for both vertical and horizontal reinforcing and as a tie unit for face brick and back-up block.

Celotex Corp.—Samples of Celocrete aggregate and Celocrete concrete units were on exhibit, also photographs of the manufacture of the aggregate and job applications. Literature was also distributed describing the properties of the aggregate and illustrating uses.

Chain-Belt Co.—Principal feature was a 7-cu. yd. truck mixer mounted on an International L-190 series truck chassis with dual rear axles and a dual front "adjusta-wate" axle for advantageous load distribution.

Chicago Fly Ash Co.—A flow chart was on display, showing how fly ash originates in a power plant and how it is collected for bagging or for bulk loading from bins. Charts were also on display showing the effects of Chicago fly ash on the compressive strength of concrete masonry units, and test data from research were available to show the effects of various percentages of fly ash in mixes for concrete block. Samples of fly ash were there to see, and photographs of leading producers' plants using fly ash in the manufacture of block, pipe, joists and slabs.

Cleaver-Brooks Co.—On display was a full-sized 125 p.s.i. self-contained boiler for delivering hot water, steam or heat. These units are made in various sizes and are fired by gas or oil or a combination of the top fuels.

The Cleveland Vibrator Co.—Had a working exhibit, of its air vibrators as applied to the hoppers of bins. The vibrators may be installed either for intermittent or continuous operation.

Clipper Manufacturing Co.—Had on display three full-scale saws including units for cutting precast concrete and others for cutting trenches and recesses in mass concrete. Samples of

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Loading a 1,200-pound cargo of castings into an American Airlines freighter.

Right on schedule . . .

However tight the timing and whatever the type of load . . . Towmotor measures up to stiffest materials handling requirements, while bringing man-hour costs 'way down in the bargain. Write for your copy of "Man-Hour Thieves," Towmotor's new handbook for lowering plant operating costs, and name of your nearest Towmotor Representative. Towmotor Corporation, Div. 4903, 1226 E. 152nd St., Cleveland 10, Ohio.

Make the Towmotor Exhibit your first stop at the 5th National Materials Handling Exposition starting May 18, 1953

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THE ONE-MAN-GANG ®

FORK LIFT TRUCKS and TRACTORS
SINCE 1919
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

"Buck" that STIFF COMPETITION

with the

KENT STANDARD BLOCKMAKER

ONE MAN OPERATION

Place the pallet—push the button to start cycle—transfer finished block to the rack, while the next block is made.

AUTOMATIC CYCLING

Push-button starts cycle of automatic operations in sequence.

LOW OPERATION COST

Comparatively low power requirements result in economy of operation.

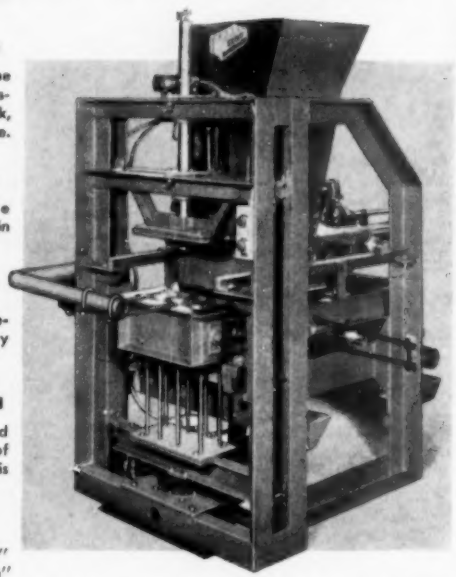
DESIRABLE PRODUCTION

One block can be produced in 10 seconds. Production of up to 360 blocks per hour is possible.

BLOCK SIZES

Per cycle— 2-4" blocks; 2-6" blocks; 1-8" block; 1-10" block, or 1-12" block.

SIMPLE CHANGE OF MOLD BOX



A small investment gives you BIG OPERATOR ADVANTAGES with the KENT STANDARD BLOCKMAKER.

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cuts made from masonry units were also on exhibit.

Columbia Machine Works—Displayed two of its newest high production block machines and full-size model of its block-splitter.

Concrete Transport Mixer Co.—Exhibited were the Hi-Lo truck-mixer of 2¼-cu. yd. capacity (3⅛-cu. yd. agitator) on a model A30 Mack truck. A 3-cu. yd. (4¼ cu. yd. as agitator). Rocket truck mixer was also on display, also photographs of job applications. The mixers feature revolving blade mixing and visible mixing action.

Construction Machinery Co.—Exhibited the 3-cu. yd. Trancrete truck mixer (4-cu. yd. agitator), also 4½-cu. yd. and 5½-cu. yd. mixers. Pictures of bins and batches also were on display.

Cook Bros. Equipment Co.—Had a 6-cu. yd. Challenge truck mixer (7¼ cu. yd. as agitator) on Ford dual-rear wheel truck, also job pictures. Literature illustrated mixers in 3, 3½, 4, 5, 6 and 6½-cu. yd. sizes and described features to permit maximum yardage without surpassing wheel-load limitations.

Wm. Bros Boiler and Manufacturing Co.—This company had on display the Bros "Lectro-Lift" and the Bros block handler with P & H Zip-Lift. The "Lectro-Lift" is a special truck body with electrically operated overhead traveling carriage with handling attachments for unloading cubes of concrete units at the jobsite. It is designed for one-man operation and quick unloading. The block handler has a 2-prong fork operated from a hoist on an overhead swinging monorail, and is also used for unloading units from trucks.

Currier's Incinerators-Barbecues—Display of precast incinerators and barbecues.

Erickson Power Lift Trucks, Inc.—New F-4W three-wheeled fork truck with 4000 lb. capacity.

Ferro Corp.—Demonstration of new ceramic glazed concrete block facing; investment required for a minimum-sized installation to produce 650-700 faced block per day is approximately $40,000. Literature also on concrete block dryer which dries block either directly from the kiln or stockpile to 1 lb. of water per 30-lb. block and handles 5000 8-in. equivalent units in 24 hr.

Fleming Manufacturing Co.—FMC-400 completely automatic block machine with 400 block/hr. rate.

Flexicore Co.—On-the-job photographs showing Flexicore floor and roof system.

General Engines Co.—Rainbow Rock slump block display; small 1-hp. electric motor operated production machine was central part of display, with three dimension color pictures showing appearance of brick in homes.

Heltzel Steel Form and Iron Co.—Scale model of complete block plant, including all aggregates handling facilities.

Jaeger Machine Co.—Main display was a 4½-cu. yd. Hi-Dump truck mixer; also small pump and mixer.

C. S. Johnson Co.—Model of wide rehandling clamshell bucket on display; photographs of other concrete products plant equipment.

J. A. Jones Concrete Machinery Co.—Continuous mixer with "constant volume densifier" which achieves constant material density by vibrating the feed conveyor belt.

Kent Machine Co.—New hydraulic, push-button controlled 2-block, automatic cycling block machine, the Ken Twin.

Klingelhofer Machine Tool Co.—Sales agent for Peddinghaus (Germany) reinforcing bar cutters and automatic bar bending machines; machines were on display.

Knickerbocker Co.—New Truck-Man 4000 lb. capacity high lift fork truck.

Krete Koater Service—Demonstration and samples of application of Sherwin-Williams Kem-Krete block coating material. Krete Koater machine includes a sander, vacuum cleaner, neutral color filler spray booth, water-washed color spray booth, pumps, conveying equipment, exhaust fan and vent.

Kwik-Mix Co.—Moto-Bug unit was on display, showing several improvements over last model.

Lith-I-Bar Co.—Two new model block machines, the Champ (2-block machine) and the Mogul (3-block machine). Quick-change mold box featured.

Littleford Bros., Inc.—Displayed "Kwik-Steam" steam generator.

J. F. Malane—Pallet cleaning service. Cleaning machine is taken to client's plant on order and pallet cleaning is supervised by service representative. Plain pallets cleaned at the rate of 250 per hr. on one side. Cost: 12 cents cleaning one side, 18 cents for both.

Master Builders Co.—Demonstration of advantages of Pozzolith concrete; abrasion tests of Masterplate concrete floors; display of Embeco non-shrink mortar for grouting machinery and heavy equipment.

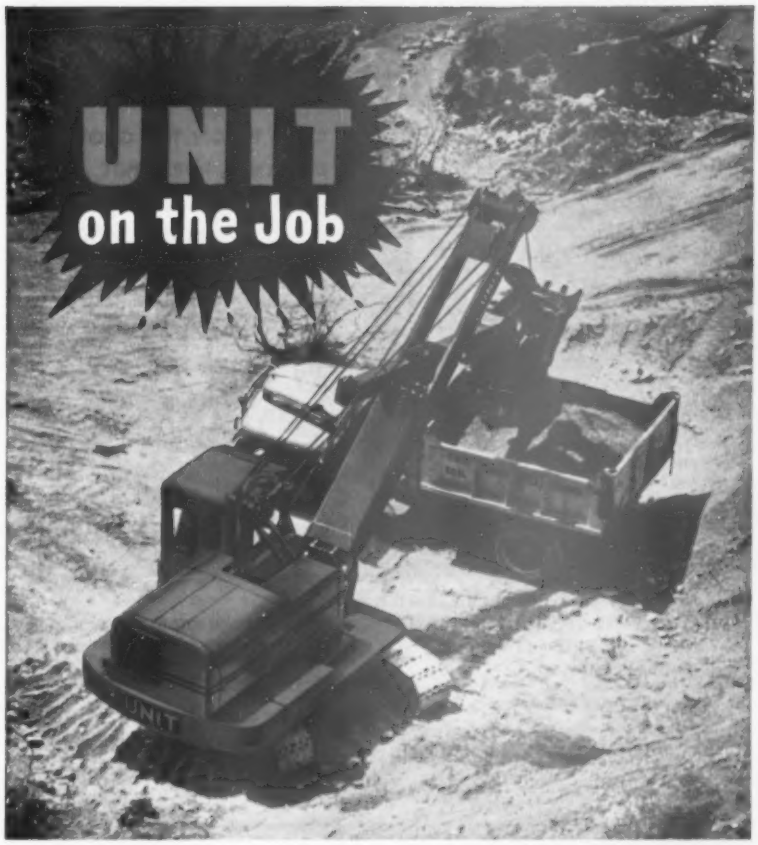
Medusa Portland Cement Co.—Literature was on display to show the various products made by this company. Of particular interest to masonry manufacturers was the new prime coat for porous masonry, called "Medusa Ruf-Seal Cement Paint."

Memphis Equipment Co.—Information on adapting surplus Army trucks to concrete transit mixing equipment.

Mingotile—Concrete facing method to simulate colored cast stone. Facing placed on 8- x 8- x 16-in. units in a press at the rate of three a minute. Fifty mold patterns are available. Facing is air cured.

Multiplex Machinery Co.—Blockmaster No. 3 hydraulic block machine, three block per cycle; completely automatic machine.

Gene Olsen Corp.—Gocorp Super-Senior plain pallet block machine and



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Here's a UNIT ½ Yard Shovel doing a PRODUCTION DIGGING JOB in a gravel pit. UNIT owners like the ease of operation and the FULL VISION CAB for complete visibility. They also like the sturdy construction and the many mechanical features, plus the ECONOMICAL PERFORMANCE and LOW UP-KEEP which all add up to EARNING POWER. Why not investigate what UNIT can do for you — on YOUR next excavating and material handling job?

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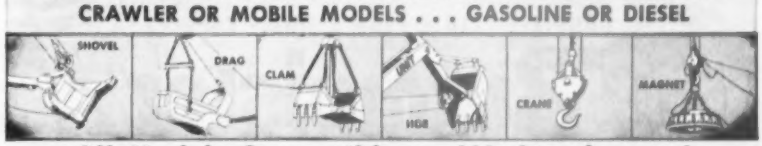

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CASH IN ON THE GROWING DEMAND FOR SPLIT CONCRETE BLOCK WITH THIS STURDY PORTABLE MACHINE

SAVES LABOR
SAVES HANDLING
LOW MAINTENANCE
LONG LIFE

Its mobility saves labor and handling. Can be moved from rack to rack, eliminating a cubing operation and the labor of one or more men.

34 SPLIT UNITS A MINUTE

Automatically assures split in exact center of block regardless of block variations. Quickly adjustable for size of block.

The TRU-AX HIGH PRODUCTION BLOCK SPLITTERS are patented and embody the best in engineering design and are field tested for dependability and performance.

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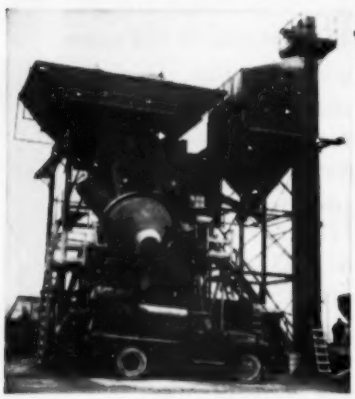

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Gocorp Jr. single cored pallet block machine.

Oswalt Engineering Service Corp.—The recently developed shock-free block ejector and front-end pallet for improving block manufacture on Vibrapac machines were demonstrated in this company's booth. Literature was available describing the equipment and services offered by this company.

Peerless Cement Co.—Literature was on display to show the various products made by this company. Of particular interest to block manufacturers were the cement paint and Dike hydraulic cement products.

Portland Cement Association—On display were samples of promotional aids and the sales kit.

Pumice, Inc.—An interesting display of samples of its pumice products produced at its Idaho Falls plant was shown.

Arthur Rehberger & Son, Inc.—A truck equipped with this company's unloader was demonstrated. With this unloader, the cubed block rest on a bed of steel rollers and the entire load is dumped to the rear by air or vacuum. Loads are held in position and controlled by a winch assembly under the forward end of the platform frame. There is a sheave mounted on each side from which a winch line extends to the rear of the load and attached to a load bar. After the load is moved to the surface, the winch lines are removed and the vehicle is drawn forward releasing the entire load in one pile.

Rock-Edge Split Stone Products—Machines were shown in action splitting block to produce pleasing, rough-surface textures.

Hercules Steel Products Corp.—A new transit mixer truck was on display, featuring an F6 Ford tandem drive with 4-cu. yd. drum. A combination oil and water tank is used. Oil passes through coil in water tank, serving to heat the water in winter and cool the oil. Another Willard-Hercules mixer truck is the 3-3¾ cu. yd. model. Literature on display described the Hercules Load-N-Gate and the Hercules line of hoists and dump bodies.

Shore Engineering—Literature on display described the new unit package high pressure steam, steel drum block curing system and steam generating equipment.

W. W. Sly Manufacturing Co.—A model of the filter system for collecting cement dust at ready-mixed concrete plants was on display as well as descriptive literature.

T. L. Smith Co.—This exhibit included one truck-mounted transit mixer unit, a mixer mounted on blocks for close inspection, and a Chrysler industrial engine.

Split-Rock Products Co.—Two models of block splitter machines were demonstrated, the smaller Buster model for standard block and the Giant for larger precast units.

Spray-O-Bond—Literature was distributed about the concrete plasticizer

made by this company and how it could be used by concrete products plants.

Standard Dry Wall Products Co.—This company distributed literature describing Thoro system paints for masonry products and water-seal products.

Stearns Manufacturing Co.—A Stearns 101 plain pallet block machine was demonstrated in action. This machine was developed for the smaller plant or for the manufacture of specials by the larger plant. A moving picture of the machine in production also was shown.

Towmotor Corp.—Two models were on display, one of which was equipped with the Schmidgall concrete block fork.

Tracto-Lift Co.—This company had a fork-lift model on display.

Transmission & Gear Co.—A Transo Load Master equipped with a bucket for front end loading was on display. Literature described the Power King fork lift and the Transo mixer.

Truax Machine and Tool Co.—A block splitter machine was shown in action and also an unloader.

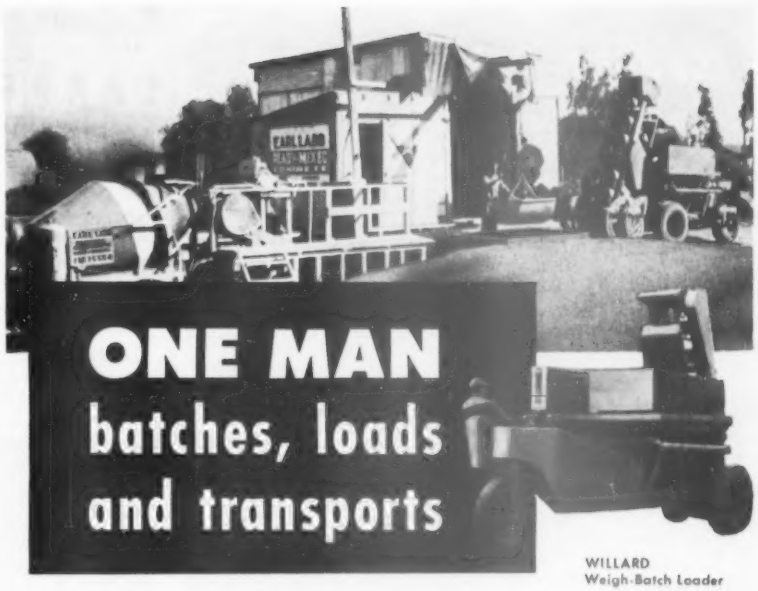
Universal Door Carrier, Inc.—Literature was on display showing the company's line of kiln closure equipment.

White Motor Co.—This exhibit consisted mainly of a display of large photographs showing truck applications in the ready-mixed concrete and concrete products industries.

Worthington Corp.—Models on display included the 56-S central mixer unit, the 4½-cu. yd. Model LC and a display board with literature on other products made by this company.

Honors Veteran Employes

LONE STAR CEMENT CORP'S Dallas, Texas, plant recently held a dinner at its new auditorium in Dallas in honor of 47 plant employes who each have completed at least 25 years of service with the company. Each of the employes is a member of the company's "25-Year Club" and has been awarded a gold watch in recognition of his service. Eleven of the employes have 40-year service records.

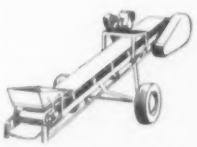


WILLARD
Weigh-Batch Loader

WILLARD-EQUIPPED READY-MIX PLANT

MAKE MONEY with your own Willard-equipped ready-mix plant like the "one man" operation shown above! In this efficient set-up the same man fills the self-loading Willard Weigh-batcher from stockpiled aggregates . . . dumps into a Willard-designed receiving hopper . . . adds bulk cement . . . empties the hopper with a Willard Conveyor into a Willard Truck Mixer . . . and drives the truck mixer to the job. This smooth flow of materials enables any number of truck mixers to follow each other in rapid succession—at a great saving in handling costs. Savings are extra large because bulk cement is used in this "Willard Way" operation.

This whole spread costs very little to buy and surprisingly little to operate. Write for information on profit-making Willard equipment.



WILLARD
Mixer Loading Conveyor

WILLARD Truck Mixer

Manufactured in Galion, Ohio and Lynwood, California

WILLARD CONCRETE MACHINERY SALES CO.
11700 WRIGHT ROAD, LYNWOOD (LOS ANGELES COUNTY), CALIF.

WRITE FOR THE "WILLARD WAY" BOOKLET

READY MIX *"the Willard Way"*

New **OSWALT SERVICE** for **VIBRAPAC OWNERS**

QUALITY BLOCKS

PRODUCTION of

Steps up

OSWALT'S *New* Shock-Free Block Ejector and Front Pallet Feeder insures smooth passage of blocks from mold, eliminates green cracking, reduces culls to minimum.

OSWALT'S *New* Simplified Device for Height and Density Control automatically assures correct, uniform height of blocks by control of vibrating motors, while adjustment of special timer maintains constant density. Signal light system enables operator to govern feed to compensate for variations in mix.

Compact mechanism gives clear space under rear of machine—clean-up is easy and safe.

INVEST IN OSWALT SERVICE for production up to 1080 units or more per hour, without sacrifice of quality!

Many satisfied customers operating scores of machines.

Write for name of Oswalt-Serviced plant nearest you.

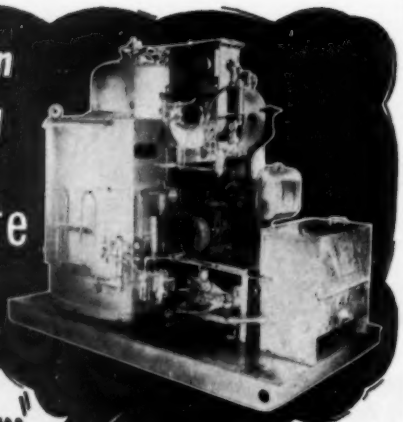
Write for NEW BULLETIN

OSWALT ENGINEERING SERVICE CORP.

1335 Circle Ave., Forest Park, Illinois

Phones: EStebrook 8-3666, FOrest 6-3898

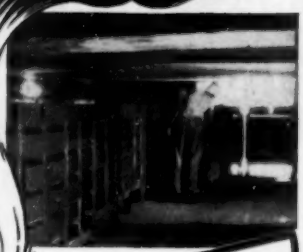
Modern Curing FOR Concrete Block



"Kwik-Steam" GENERATOR

Curing Concrete Products by Steam now can be done the "Low-Cost" way by using a Littleford "KWIK-STEAM" Generator. These compact units are the fastest steam-producing generators ever designed, *they deliver steam in 2 minutes' time from a cold start*, and only operate when steam is needed. Being fully automatic they require little attention and do not need a specially trained operator. Made in models to fit any curing space; sizes range from 20 to 165 B. H. P.

Cut your curing time and curing expense, have a "KWIK-STEAM" Generator on the job.



LITTLEFORD

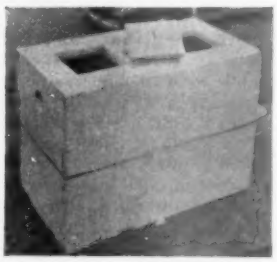
LITTLEFORD BROS., INC.
400 E. Pearl St.
Cincinnati 2, Ohio

Memo . . . "must write today" for full information on

CARPENTER *Profit-Boosting*

SEPTIC TANK FORMS AND HANDLING EQUIPMENT

Concrete producers from coast to coast are reaping extra profits from septic tanks made with CARPENTER Equipment. This method assures big output of quality units, economically produced. One man handles our delivery rig.



CARPENTER MFG. CO.
Phone 28938, R.F.D. 1, Box 470
Richmond 23, Va.

CONCRETE BURIAL VAULTS

AMERICA'S FINEST MOLDS AND LOWERING DEVICES

TERRITORY FRANCHISES

BERG VAULT SYSTEM

BERG VAULT CO.

EQUIPMENT DIVISION

1030 LUCAS HUNT RD. ST. LOUIS

FREE SERVICE for Buyers

Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this list to us, and we will take care of the rest.

TEAR OFF HERE

- Admixtures, Aggregate
- Aftercoolers, Air
- Aggregates (special)
- Air Compressors
- Air Separators
- Asphalt Mixing Plants
- Bagging Machines
- Bags
- Barges
- Batchers
- Belting, Conveyor, Elevator, Power Transmission
- Belting, V-Type
- Belt Repair Equipment
- Bin Level Indicators
- Bins and Batching Equipment
- Blasting Supplies
- Block Machines Concrete Building
- Bodies, Trailer
- Brick Machines and Molds
- Buckets
- Bulldozers
- Cars, Industrial
- Classifiers
- Clutches
- Coal Pulverizing Equipment
- Concentrating Tables
- Concrete Mixers
- Concrete Mixing Plants
- Concrete Specialty Molds
- Concrete Waterproofing and Dampproofing
- Conveyors
- Crushers
- Coolers
- Cranes
- Derricks
- Dewatering Equipment, Sand
- Diesel Engines
- Dragline Cableway Excavators
- Draglines
- Dredge Pumps
- Drilling Accessories
- Drills
- Dryers
- Dust Collecting Equipment & Supplies
- Electric Motors
- Engineering Service, Consulting and Designing
- Explosives & Dynamite
- Fans & Blowers
- Flotation Equipment
- Front End Loaders
- Gasoline Engines
- Gear Reducers
- Generator Sets
- Grinding Media
- Gypsum Plant Machinery
- Hard Surfacing Materials
- Hoists
- Hoppers
- Kilns: Rotary, Shaft, Vertical
- Locomotives
- Lubricants
- Masonry Saws
- Mills
- Pulverizers
- Pumps
- Scales
- Screen Cloth
- Screens
- Scrubbers: Crushed Stone, Gravel
- Shovels, Power
- Speed Reducers
- Tanks, Storage
- Torque Converters
- Tractors
- Tractor Shovels
- Trailers, Dump Body
- Truck Bodies, Dump
- Trucks, Industrial
- Trucks, Mixer Body
- Trucks, Motor
- Vibrators
- Welding & Cutting Equipment
- Winches
- Wire Rope

If equipment you are in market for is not listed above, write it in the space below.

RP-3

Your Name_____ Title_____

Firm Name_____

Street_____

City_____ State_____

Send to:

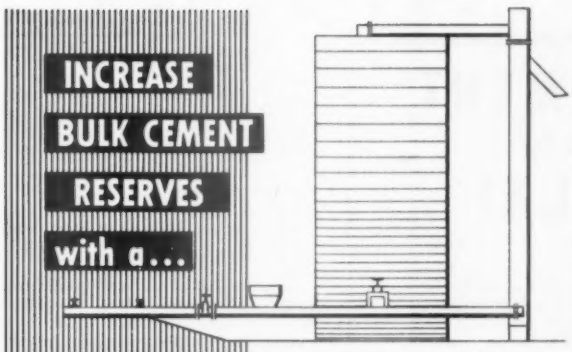
Research Service Department

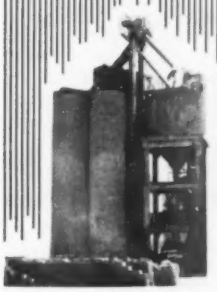
ROCK PRODUCTS

309 W. Jackson Blvd. • Chicago 6, Illinois

INCREASE
BULK CEMENT
RESERVES
with a...

MARIETTA
storage
system





With a large capacity MARIETTA storage system, with its multiple silos, you can stockpile bulk cement reserves, avoid shortages and keep your production high. As the sketch shows, MARIETTA concrete stave silos can be used with pneumatic conveyors, or any type of materials handling equipment. These sturdy, fire-resistant tanks give you large capacity, low cost handling, keep your bulk cement in an "always ready-to-use" condition. Write for details on new methods for storing, handling bulk cement.

The MARIETTA Concrete Corp.
MARIETTA, OHIO

BRANCH OFFICES:
509 Fifth Ave., New York 17, N. Y.
Pulaski Hwy. at Race Rd.,
Baltimore 21, Md.
805 Bessemer Bldg., Pittsburgh 22, Pa.

"BRANFORD" PNEUMATIC VIBRATORS

"BRANFORD" Vibrator installed on sand hopper

Reduce Material Handling Costs
Install "BRANFORD" Air Vibrators

to promote free flow of materials thru hoppers, bins, screens and other material handling equipment.

ECONOMICAL OPERATION • EASY INSTALLATION
NO DESTRUCTIVE POUNDING
SIZES TO HANDLE ANY JOB — LARGE OR SMALL

Send dimensional data; nature of material, etc., for our recommendations.

New Haven VIBRATOR COMPANY
145 CHESTNUT STREET, NEW HAVEN, CONN.

Increase **BLOCK** Output
with a Sturdy
Erickson

The Platform Truck
"Custom-Built" for your
racks—from 60 to 108
or more 8x8x16 blocks.

"THE BACKBONE OF BLOCK PRODUCTION" is what users still call the Erickson Platform Truck. Its rugged dependability to handle loaded racks from block machine to kiln assures top speed production with no delays or shut downs. The Erickson platform picks up all racks from the ends and places them close together in the kiln—no wasted space. For faster operation Erickson now offers 4 speeds forward and 4 speeds reverse. We will build you a truck exactly suited to your racks and doorways. Also fork type trucks.

Write for Catalog on Complete Line.

Erickson POWER LIFT TRUCKS, Inc.
1405 Marshall St. N. E. • Minneapolis 13, Minn.

Discover the *Better*
LOW-COST WAY
to build masonry walls of Enduring Beauty

• Now available in both lap and butt weld

CUT construction time and costs with custom-designed, butt welded Dur-O-wal. Because of the quality hardness of the steel and manufacturing precision, Dur-O-wal readily falls into place. Stiff, electrically-welded Dur-O-wal eliminates the wasteful inefficiency of unwieldy rods. Dur-O-wal's trussed design incorporates architecture's oldest reinforcing principle . . . provides both vertical and horizontal reinforcing of the highest rating. Avoid substitutes . . . insist on genuine Dur-O-wal for top performance.

DUR-O-WAL
WITH TRUSSED *Design*

The backbone of steel for EVERY masonry wall.

Write plant nearest you

Dur-O-wal Products, Inc.
P. O. Box 628
Syracuse 1, New York

Dur-O-wal Div., Dept. 656
Cedar Rapids Block Co.
Cedar Rapids, Iowa

CLASSIFIED ADVERTISEMENTS

FOR SALE

Howat Concrete Company, Inc., is offering for sale nine transit mix concrete truck mixers. Sure, these are old truck mixers but have been reconditioned and are in good operating condition.

No. 28, one 1944 Brockway truck, Model 152W mounted with 4 c.y. Rex horizontal mixer.

No. 38, one 1942 Brockway truck, Model 152W mounted with 4 c.y. Rex horizontal mixer.

No. 31—No. 32—No. 34, three 1940 Brockway trucks, Model 7 M Spec. each mounted with 4 c.y. Rex horizontal mixers.

No. 4—No. 6—No. 12—No. 16, four Brockway trucks Model T.M. Spec. each mounted with a 3½ cu. yd. Rex horizontal mixer.

As stated above, this equipment is all in good operating condition, is at present time operating on the streets of Washington, D.C., and can be seen at our plant.

Howat Concrete Company, Inc., is offering for sale two complete concrete plants consisting of the following items:

PLANT 1

1 Air compressor (Elec. Motor) for Cement Bin.
1 100-Ton—Blawknox—3 Comp. Aggregate Bin—5 yd. Hopper and Scales.
1 400 Bbl. Blawknox Cement Bin 1 Comp. with screw, elevator & 5 yd. Hopper and scales.
1 400 Bbl. Aux. Cement Bin—Blawknox.
1 Butler Hopper Gate 15" x 15".
1 Water Meter—2" Neptune—Model 240.
1 Butler No. 7 Track Plant with Screw, Elevator & Gas Motor.
1 Littleford Steam Generator Plant—Model 1000E with elec. Motor.
2 Aero Hot Water System with 1" Elec. Pump.
1 Belt Conveyor with new never used extra motor.

This plant is now in operation at Blue Ridge Summit, Pennsylvania, but will be free by March 1st. It was put in operation, completely new on July 10, 1952 and has handled less than 50,000 cu. yds. of concrete. Can be seen by contact with our Washington office.

PLANT 2

1 100 Ton—3 Compartment Aggregate Bin—Johnson, with 2 yd. Hopper & Scales.
1 300 Bbl. 1 Compartment Cement Bin, Blawknox.
1 Bin Indicator for Cement Bin—Blawknox.
1 Butler Cement Elevator—10" Screw—7½ H.P. Motor.
1 Butler Cement Screw Extension 10"x10'.
1 Bucket Conveyor—100 Ton per hour, with 15 H.P. Electric Motor, never used.
1 Front End Loader—¾ yd. Sheppard & Set Teeth.
1 Butler No. 7 Track Plant, with screw, elevator & Gas Motor, never used.
1 Butler Screw Extension 10" x 10'.
1 1-yd. Concrete Mixer with Elec. Motor.

This plant may be seen on our yard at the above address. It will be noted that while the aggregate bin, cement bin and cement elevator have been in operation, the balance of the equipment such as the cement track screw, the aggregate elevator and other items are entirely new and never have been used, owing to the type of set-up on which this plant was used.

HOWAT CONCRETE CO., Inc.
2 "S" Street, S. W.
WASHINGTON 4, D. C.
Phone: Lincoln 6-5522

EQUIPMENT FOR SALE!

STEARNS #9 Joltcrete.....$2500.
STEARNS #7 Joltcrete..... 2000.
STEARNS 18 cu. ft. Concrete Mixer 750.
STEARNS 28 cu. ft. Concrete Mixer 1500.
STEARNS 18 cu. ft. Skip Loader... 750.
STEARNS 42 cu. ft. Skip Loader... 1500.

Largest Stocks of Pallets in the World. Send tracing or sample for quotation.

Write . . . Wire . . . Phone . .

GENERAL ENGINES CO.
307 HUNTER ST., GLOUCESTER CITY, N. J.

FOR SALE

Concrete Irrigation Pipe Manufacturing Plant. Located central San Joaquin Valley near Fresno. Exceptionally modern in mechanized equipment from handling of materials to loading cured pipe. $20,000 net 1951, ($20,000 plus) net to September 30, 1952. Owner established business 1937, has highest rating by Dun and Bradstreet. Underpriced at $76,500 plus inventory at cost. $6,000 a year manager will continue during transition period at reduced salary.

Address:
CARUTHERS CONCRETE PIPE CO.
P.O. Box 115, Caruthers, California

FOR SALE

$300,000.00 concrete products plant consisting of 20 acres plant site; one new block plant; one new drain tile and concrete well curbing plant; one main plant covering 20,000 square feet. This space includes the culvert pipe division and small drain tile; one repair shop 1700 square feet; one gravel washing plant; six acres of good gravel land. Capacity of manufactured products 400 ton per day or approximately one million dollars per year, figuring nine months to the year. Don't write unless you expect to buy this plant complete, real estate and all. Will not sell machinery separate.

LAKE VIEW CONCRETE TILE CO.
Lake View, Iowa

BUILD GOOD WILL FOR '53

With U.B. Line stretchers the most economical way, to keep your name before your mason's and mason contractors every working day of the year. Line pins, twigs, corner ties, and tools for the Blocklayer.

UNITED BUILDERS
1822 Lindberg Drive, Muskegon, Mich.

UNBREAKABLE
PALLET RINGS
Write for full information
TEXAS FOUNDRIES
LUFKIN, TEXAS

GOOD USED KORPACK BLOCK MACHINE WITH 4", 8" AND 12" ATTACHMENTS AND ALL PALLETS.

ARENZ BLOCK COMPANY
KIEL, WISCONSIN

FOR SALE

Multico # 2
4" Attachment
8" Attachment
Chimney Block Attachment
Power Offbearer

1 Multico # 2 with power-pak
1 Offbearer, electric motor type
1 Complete moldbox and pressure head assembly for two 7⅝" blocks.
1 Complete moldbox and pressure head assembly for four modular 3⅝" blocks, 2 cored, 2 solid.
1 Complete moldbox to make one chimney block.

This equipment, practically new, will be sacrificed by the owner. Reason for sale: Recently purchased much larger production unit. BOX L-44, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

FOR SALE

One (1) 2 cu. yd. Butler Cement Weigh Batcher having 14 cu. ft. capacity, including scales having one (1) tare beam and three (3) weigh beams with selonoid lifters. One (1) 8" x 15" Rotary Cement Valve for air operations with all controls.

MID-SOUTH CONCRETE PIPE CO.
P.O. Box 6833, Hollywood Station
MEMPHIS 8, TENN.

FOR SALE

Model 9 Joltcrete with offbearer,
PERFECT CONDITION.
8" Attachment with 4,500 steel 50% air space pallets.
8" Header block attachment.
3" Attachment with 4,000 steel pallets.
4" Attachment with 3,000 steel pallets.
12" Attachment with 2,000 steel 50% air space pallets.
60 Model 72 steel racks.

INSPECT THIS IN OPERATION

OLSEN SALES COMPANY
Rock Rapids, Iowa

CONCRETE BRICK COLORS
CEMENT COLORS
MORTAR COLORS
made by
BLUE RIDGE TALC CO., INC.
Henry, Virginia

FOR SALE

BLOCK PLANT, capacity 2,500 blocks daily. With Stearns No. 7 pallets, molds, etc., for 8's and 12's. Powermaster 30 H.P. Steam generator. Lift truck. Next door to fastest growing Washington, D. C. metropolitan area. Price $37,500. In less than two years you can be clear and rolling free of debt. Box L-32, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Illinois.

FOR SALE
2 Hydro-Korpak Block Machines.
3200 Pallets 8x8x16, 1000 Pallets 12x8x16, 1400 Pallets 4x8x16.
One Rotary Pallet Dunker.
Can be seen in operation. Installing larger equipment. Best offer takes.
BAILEY DUNBRICK COMPANY
St. Augustine, Fla.

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

FOR SALE
F M C 180

Fleming Concrete Block Machine purchased March, 1951, in use nine months. Very good condition. Price—$2500.00 including all extra parts and mold boxes.

BOREE CONCRETE BLOCK CO.
523 Estelle Lane, Jacksonville, Fla.

FOR SALE

1—Clark Dyna-tork, 4000 lbs., 3 block forks, 108" lift. Pneumatic tires, 18 months old $3,000.00

CAMOSSE BROS. INC., AUBURN, MASS.
Tel: Worcester 4-1139

FOR SALE

BLOCK PLANT — Capacity 1800 blocks daily. In city of 18,000 — no other within 40 miles. Photos and complete information furnished on request. Price $30,000.00. Might consider $10,000 cash for partial interest, with privilege of acquiring business later on. 10—all Welded Steel 48 Block Capacity racks and a hand operated 10-concrete brick capacity machine.

CAMERON, JOYCE & SCHNEIDER, INC.
Keokuk **Iowa**

READY-MIX PLANT FOR SALE. LOCATED AT MANCHESTER, IOWA. POSSESSION AT ONCE.

T. A. HENDERSON
MONTICELLO, IOWA

STOP *that* WATER

With FORMULA NO. 640

A clear liquid—7 different resins in a solvent which penetrates 1" or more into concrete, concrete blocks, stucco; seals, holds 1250 psf water pressure. Applies quickly — no mixing — no furring — no membranes—no cleanup. Use on forms—wood or concrete.

HAYNES PRODUCTS CO., OMAHA 3, NEBR.

SACRIFICE for QUICK SALE

Model 7 Jolterete with Power Carriage, Agitator, Offbearer, 4, 6, 8, 10, and 12 inch attachments. Pallets: 2500—4", 2000—6", 2000—8", 1500—10", 1000—12". 60 Racks. All equipment in A-1 condition.

OLSEN SALES COMPANY, Rock Rapids, Iowa

"BESSER"

40 Cu. Ft. Concrete Batch Mixer—Spiral Blades, Roller Bearing, Self Discharging with Drum Grid. Powered with 25 H.P. 3/60/440 volt motor. V-Belt Drive and enclosed gear house.

TINKLER EQUIPMENT CO.
2590 Oakdale Ave., San Francisco, Calif.

FOR SALE

3—Truckman Model "D".
1—Stearns Clipper Stripper.
1—Stearns 12 cu. ft. Mixer.
Approximately 1200 pallets.
Priced to sell.

LINWOOD CONCRETE PRODUCTS
1001 Kingshighway, East St. Louis, Ill.

CEMENT COLORS

Write for free samples and prices of "LANSCO" CEMENT COLORS produced in 50 attractive shades. Packed in bulk and in 1 lb. and 5 lb. packages.

manufactured by

LANDERS-SEGAL COLOR CO.
73 Delevan St. **Brooklyn 31, N. Y.**

FOR SALE

29—72 block plain pallet racks for use with magnetic off-bearer. Sturdily constructed. Never used. SMITH CONCRETE PRODUCTS CO., Kinston, N.C.

WANTED TO BUY!

PRESSED STEEL

PALLETS

WE BUY COMPLETE BLOCK PLANTS

Write . . . Wire . . . Phone . . .

GENERAL ENGINES CO.
307 Hunter St., Gloucester City, N. J.

LOWER COST

PACKER-HEAD WINGS

Proved to last as long or longer — yet cost considerably less. Write for prices.

TEXAS FOUNDRIES
LUFKIN, TEXAS

O-K Semi Automatic Vibrator Septic and Cesspool Block Machine. Completely overhauled, 1st class condition, now operating; also approximately 1500 pallets.

MOLIN CONCRETE PRODUCTS
885 Minnehaha Ave., West, St. Paul 4, Minn.

FOR SALE

1—Kent #4 Flo Master Mixer
1—FMC Model #12 Batch Mixer
Both in excellent condition
Price $800.00 each.

MACLAY CONCRETE, INC., FESTUS, MO.

A large New Jersey Concrete Concern has an opportunity for a ready mixed concrete truck Dispatcher, must be experienced. Please write in care of BOX L-43, ROCK PRODUCTS, 309 West Jackson Blvd., Chicago 6, Illinois.

WANTED

A Truck-Man, Model D, 2000 lbs., low lift platform truck made by Truck-Man, Inc. Send complete details, condition, location, price, etc., to:

JACKSON SAND MINING CO.
Box 269, Jackson, Ohio

WANTED

Martin Concrete Pipe Machine, slip joint forms, all diameters; will buy machine or forms separately if necessary.

BOX L-41, CONCRETE PRODUCTS
309 W. Jackson Blvd., Chicago 6, Ill.

WANTED

Stearns 12 or 18 ft. skip loader in good condition, also Multiplex chimney block machine.

A. E. ANDERSON
Park Rapids, Minnesota

A vital message to the head of the family

Two ways you can protect your family against CANCER

. . . a check
. . . a check-up

Cancer strikes in one of every two families. Each year more than 60,000 American children under the age of eighteen lose a parent to cancer.

Yet many cancers can be cured, if discovered in time.

Every man should have a complete physical examination once a year. Women over thirty-five should have a complete physical examination twice a year.

Because of scientific advances, patients are being cured today who could not have been saved even five years ago.

The American Cancer Society asks your help in the fight against cancer. Your check today will help pay for costly research. Will help keep physicians informed of latest developments in detection and treatment. Will help pay for the training of doctors to specialize in cancer.

How soon we find cancer's cause and cure depends on how soon and how much help comes from people like you.

Invest your money today for your family's security tomorrow.

"Cancer" c/o Postmaster, (Your town)

Please send me free literature about cancer.
Enclosed is my contribution of $_____ to the cancer crusade.

Name_____

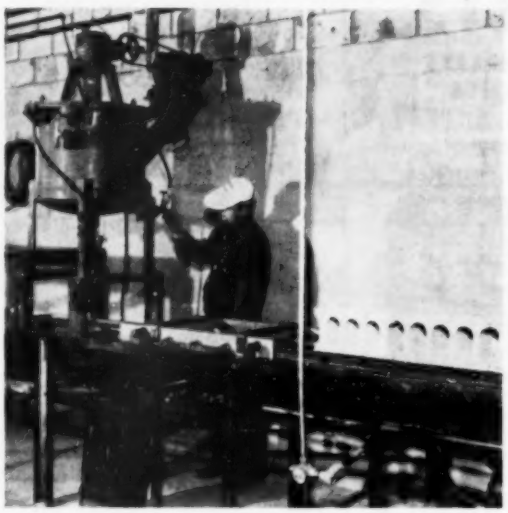
Address_____

City_____ State_____

Cancer strikes One in Five
STRIKE BACK . . .
Give to Conquer Cancer

Spectra-Glaze*

IS HEAT-TREATED —AT LOW COST—



Standard Glaze Block Corporation, Troy, N.Y. heat-treats Tile Face SPECTRA-GLAZE Units with their regular low-pressure steam system.

Using a compact mold loading machine designed for the Burns & Russell casting process, Standard Glaze Corporation realizes the following product advantages:

- Straight and true edges on each face
- Exact and identical face dimensions
- Smooth and uniform face surface
- One-quarter inch exposed joint

REGARDLESS OF VARIATIONS IN THE BASE BLOCK.

Only regular production block out of the yard are glazed, no special pre-drying or grinding is necessary. No skilled labor, either.

The tile-like appearance of SPECTRA-GLAZE has created a ready acceptance of the product for use in schools, hospitals, defense industries, etc.

Standard Glaze has found that SPECTRA-GLAZE is providing a profitable extra market for their block.

More than a million SPECTRA-GLAZE Units have been produced and installed.

SPECTRA-GLAZE is a proven product.

For manufacturing information write

THE BURNS & RUSSELL COMPANY

Tower Building Baltimore 2, Maryland

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LARGE PHOTO—1,000,000-lb. roof slab—first inverted beam slab to be raised in this country.

SMALL PHOTOS—Top view of 1,000,000-lb. slab; also 400,000-lb. lift-slab.

Temple Isaiah, Los Angeles, Calif. Archt.—Kenneth N. Lind, A.I.A.; Struc. Engr.—Brandow & Johnston; Contr.—Zimmer Construction Co.; Sub. Contr.—Vagtborg Construction Co.; Pozzolith Ready-Mixed Concrete supplied by Consolidated Rock Products Co.—all of Los Angeles, Calif.

First Inverted Beam Lift-Slabs Are POZZOLITH CONCRETE

IN a letter about this job, Zimmer Construction Co., the contractor, said—"With the use of Pozzolith in our concrete we were able to . . . pour both slab and beams together with 3½" slump, yet were able to maintain the necessary workability so necessary in this type of pour without excessive vibrating.

"Further, with the use of Pozzolith we obtained a seven day test of 3,200 pounds and a twenty-eight day test of 4,600 pounds, allowing us to raise these slabs in seven days instead of the usual fourteen day delay."

Better, more economical concrete is obtained with Pozzolith because it *reduces the unit water content* of a mix approximately 15%. As stated by the American Concrete Institute (ACI 613-44, Page 655)—"For a given set of materials and water-cement ratio, the unit water content (water required per cubic yard of concrete) is the most important basic factor affecting the quality of concrete." Obviously, for a given water-cement ratio, the mix requiring the lowest water content will also produce the most economical concrete.

Investigate the advantages of Pozzolith for your next job . . . it will enable you to obtain the required qualities *at lower cost than by any other means*. "See-for-yourself" Pozzolith demonstration kit supplied on request . . . without cost or obligation.

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

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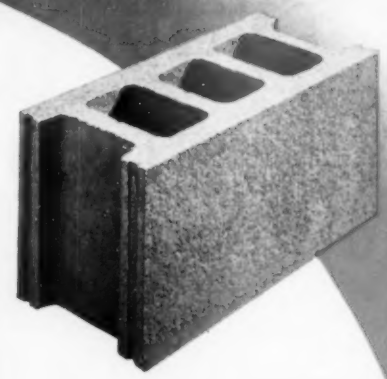

You can build concrete masonry structures in beautiful architectural designs with the assurance they will last a lifetime. Both exterior walls and interior partitions are made in many pleasing patterns by varying the styles and sizes of block. The initial cost is low and the upkeep is nil.

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CHURCHES find concrete masonry construction both practical and economical.

CONCRETE PRODUCTS PLANTS: This advertisement is one of a series prepared by Besser and scheduled to appear in American Builder, Practical Builder, Masonry Building and Engineering News Record. We trust these advertisements will help you in developing new markets for concrete masonry — the modern building material.

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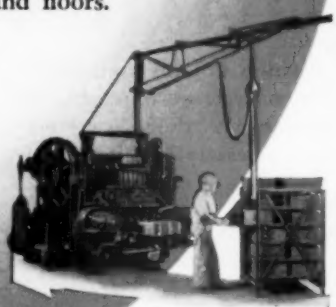
Alpena, Michigan, U. S. A.



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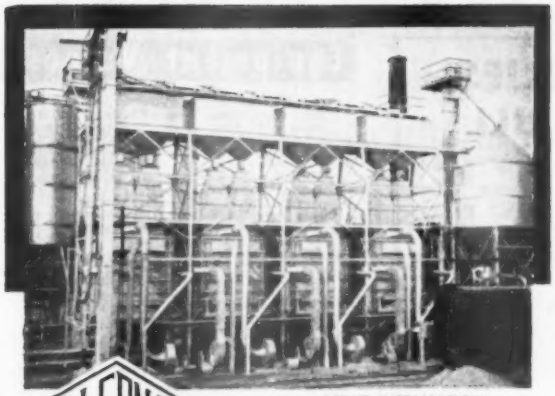

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1—5 roll Raymond High Side.

6—#1, #0, #00, #000 Raymond Mills.

3—#0, #00, 8″ Raymond Screen Mills.

2—#51 Raymond Imp Mills.

2 Mikro #2TH, #4TH.

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6—Hardinge Mills, 3′ x 8″, 5′ x 22″, 6′ x 22″, 8′ x 48″.

4—Tube Grinding Mills, made by Traylor E. & M. Co., Allentown, Pa. Silex lined, 4′ x 13′, 4′6″ x 18′6″, 5′ x 22′ and 5′ x 20′. Also 2—5′6″ x 20′ iron lined, with motors.

8—Pebble Mills, porcelain lined; 3—6′ dia. x 8′, 800 gals. each. 1—6′ x 5′, 3—5′ x 4′, each with ball charge.

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2—2 stage Washing Classifiers, each with two rakes in tandem, in steel trough 26′6″ long x 3′ wide, with drives.

1—6′ x 14′ Hardinge Rotary Counter Current Classifier, also used for dewatering and scrubbing.

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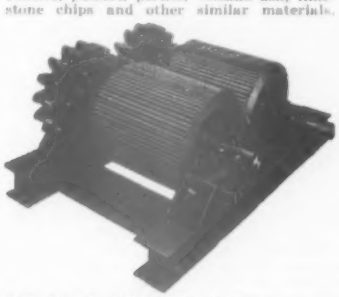

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1—42"x16", 36"x16", and 24"x12" crushing rolls.
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1—42"x48", 24"x36", 18"x36" jaw crushers.
1—1200 or 1500 bbl. cement plant.
14", 16" McCully Superior Gyratory Crusher.
5' x 50' x ½" dryer. 1—8' x 80' kiln.
New and Rebuilt Dryers—Kilns and Coolers

W. P. HEINEKEN, INC.
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WINTER CLEARANCE

MATERIAL LOADERS

Hough "HL" 1-yd. Payloader, Gravity Dump. Reconditioned.
Haiss "77C" Crawler Bucket Loader. Reconditioned.
Barber-Greene "522" Rubber-tired Bucket Loader. Reconditioned.
Cletrac "DGH" Gas Tractor with Drott Hyd. Loader. 1100 hours. Like new.
Caterpillar "D-4" Diesel Tractor with Traxcavator Front End Loader.

TRANSIT MIXERS

Smith 3 yd. Hi-Discharge Mixer with White Truck.
Rex 3 yd. Hi-Discharge Moto-Mixer, unmounted.
Rex 2 yd. Hi-Discharge Mixer with Ford Truck.
Rex 2 yd. Hi-Discharge Mixer with Chev. Truck.

CRANES AND SHOVELS

Lorain "TL-25-K" ⅜ yd. Diesel Hoe. Reconditioned.
Koehring "301" ⅝ yd. Gas Dragline, 45' Boom, Fairlead. Cheap.
Link-Belt "LC-55" ½ yd. Dragline or Hoe, self-propelled, rubber-tired unit.
Insley "K-12" ½ yd. Dragline, 30' Boom and Fairlead.
Sargent "38" ⅝ yd. Trench Hoe, mounted on GMC 6x6. Demonstrator. Discount.
IHC "T-9" Gas Tractor with Hell Cable Dozer. Reconditioned.
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Cedarapids Portable Primary Plant on Pneumatics with 1524 Jaw Crusher, 24" x 6'0" Apron Feeder, gas power, 30" discharge conveyor, etc.

EIGHMY EQUIPMENT COMPANY
ROCKFORD, ILLINOIS

1—10" x 20"—#4½ Champion Jaw Crusher—Rebuilt.
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1—6" x 9" New Holland Jaw Crusher.
1—20" x 10" New Holland Swing Hammer Pulverizer.
1—Kent-Maxecon #7 Ball Bearing Ring Roll Mill & Vee Belt Drive.

We build open & totally enclosed bucket elevators & belt conveyors to suit your needs.

Large stock chain, sprockets, buckets & conveyor pulleys—new & used.

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2880 Jr. Gravelmaster; 75 TPH Washing PLANTS.
CRUSHERS: 9x16 Univ., 10x30 Champion, 15x26 Gruendler, 18x36 and 20x36 Cedar Rapids, 24x36 Farrell, 30x42 Univ., 48x36 Farrell and 42x48 Traylor JAW. No. 25 and 37 Kennedy 10H, 13B, 16B, and 20A Telsmith. 10" and 14" McCully. 7" and 10" Newhouse GYR. 2' Symons CONE.
APRON FEEDERS: 3x6½', 3x8 and 3x10'.
ROTARY DRYERS: 4½x35, 6x50 and 7x60.
MILLS: Williams Comet 4 roll high side. 24x36 Jeffrey. 2 and 3XB Gruendler, 6x22 Hardinge.
10" DREDGE SAND PLANT. Reasonable.
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45 Ton GE Diesel Elec. Locomotive, Std. ga.
Caterpillar D13000 Power Unit. Good.
H&B PA20 all elec. 2000 lb. Asphalt Plant.

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65 Ton G. E. Diesel Elec. Loco.
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130 HP Christian 2d Diesel Hoist
30 Ton Ind. Bh. Gas. Loco. Crane
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10 Ton Lorain MC-2 Motor Truck Crane
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FOR SALE

1—Acme #8½A Jaw Crusher, 9x16, 20 HP motor
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1—Rotary Hot Air Dryer 46" dia. x 26' L
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Sand and Gravel Business in Central New York. Up-to-date Modern Washing Plant. Low Cost Operation. Twenty Years' Supply of Raw Materials.

Price—$100,000

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Stearns Jolterete No. 7 Block Machine complete, in good running condition—Elec. switch boxes, extra vibrator motor—two 8" mold boxes & pressure heads—one 4" mold box & pressure head—pressure heads for 8" corners, sash, pilaster and bull nose blocks—cores & pressure heads for 8" halves in commons, corners, sash and bull nose—4200 4" steel pallets—2900 8" steel pallets—450 8" corners pallets—200 8" sash pallets—150 8" pilaster pallets—600 8" half pallets for commons, corners, sash, bull nose,—check plates & attachments for 8" bull nose—both round and single round corners—one Stearns Hydraulic Off Bearer—all cleaned & ready for immediate use. Phone or write Frederick G. Smith & Company, 327 E. Stephenson St., Freeport, Illinois. Phone Main 3700.

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DREDGE DISCHARGE HOSE: 6⅝" I.D. x 6' 8" long, ¼" gum tube. 90% life.
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HOSE CLAMPS: 4", 6", and 7". New and used.

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60 HP prime

DIESEL ENGINE

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Special—New 3'x14' Pioneer scrubber screen with sand jacket; big discount.

Lorain 40 shovel	Morris 10" manganese gravel pump	Butler Carscoop
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Lorain 30 dragline	Cedar Rapids 40x20 roll crusher	45 ton port. bin
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These machines reconditioned in our newly-built daylight plant. Come see them!

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36 INCH 1-180'—2-250'—1-320'—1-400'—1-500'—2-1000' & 1-1600' Long.
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EXTRA IDLERS, TERMINALS & BELTS.

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1—4'x20', 2—4'x45', 1—4'x60'
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9—4 TON AND 6 TON GOODMAN, 36 IN., GAUGE BATTERY LOCOMOTIVES.
65 TON G.E. DIESEL ELEC.
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20 TON WHITCOMB GAS.
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30 TON INDUSTRIAL GAS.
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48 x 60 SUPERIOR JAW CRUSHER.
24 x 36 FARRELL JAW CRUSHER.
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CLASSIFIERS: 4—Akins and 4—Wemco 54" x 32'10", Simplex, double pitch, type S, with 220/440 volt syncrogear motor and lifting device. Four located in Nevada.
DREDGE: 10" Electric, 220/440 volt, complete sand processing plant, steel hull, 200 yds. per hour, thoroughly modern.
APRON FEEDERS: 2—Heavy duty type, 60" x 15'
SCALPING SCREENS: 2—Heavy duty type, 6' x 12'
STEEL RECEIVING HOPPER: 150 tons capacity.
APRON CONVEYOR: 48" x 110'. Complete specifications and drawings available.
Above items new 1951.
CRANES: 1—Overhead Electric Travelling Crane, 7½ ton, 80 ft. span, 4 motor, bucket handling with or without Hayward 2½ yd. class E or Blaw Knox 2½ yd., type 730-W, clam shell buckets, 440 volt, 3 phase, 60 cycle.
LOCOMOTIVE CRANE: 25 ton capacity, thoroughly modern, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. clam shell bucket. For sale or rent. Located Minnesota.
COMPRESSOR: Worthington DC2, 29/18½ x 21, motor 600 HP. synchronous, 440 volt, with all auxiliary equipment.
TRUCKS: 4—Euclid, 15 ton, end dump, rock bodies, Cummins diesel motors.
PORTABLE CRUSHING PLANTS: One Pioneer 30 x 42 and one Cedar Rapids 15 x 24, both complete with power.
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DIESEL MOTOR: Caterpillar D13000 portable on skids, 122 HP.
KILNS: 2—7' 6" x 125' complete, with or without Fuller grate type coolers. 1—8' x 80'.
PULVERIZERS: Hardinge steel lined Conical Ball Mills complete with motors and auxiliary equipment for dry grinding, sizes 5' x 22", 10' x 36", 10' x 48". 1—Eimco 3' x 4' complete, NEW, UNUSED.

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Gruendler 2XA antifriction pulverizer.
Stedman B-30 hammermill, 30" x 24".
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New Holland 3-G 4 roll crusher.
Power & Mining double roll crusher, 24" x 14".
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Robins double roll crusher, 18" x 24".
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Double roll cinder crusher, 12" dia. 16" face.
Jaw crushers, Symons 2' Cone Crusher, short head.
Sullivan single drum portable 7½ hp. hoist.
Ing. Rand double drum electric 5 hp. hoist.
5 overhead air and electric hoists.
Gearmotors, motors, 40 hp. alternator 115 DC.
Motor reducers, reducers and Vari drives.
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New Universal vibr. screens in stock.
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Cement valves, bin gates, screw conveyors.
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600 two wheel ball bearing trolleys.
30", 36" and 42" belt conveyor equipment.
Trough idlers 14", 16", 18" and 24".
Conveyor belt 12" to 36". New & Used.
Elevator belt 8" to 18" wide.
Steel apron conveyors, 24" x 46' and 30" x 30'.
Merrick conveyor scales for 30" and 16" belt.
Enclosed 10", 12", 14", 16", 18" bucket elevators.
Continuous belt and chain elevators, 8" to 16".
Spaced 6" stainless bucket elevator on 8" belt.
20" wide flat belt conveyor up to 300'.
Crucible 1¼" steel rock bits.
Pumps, gravity conveyors. Reducer Motors.

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136 Coit St., Irvington, N. J.

TRUCK MIXERS FOR SALE

2—Hi-Lo, 3 yd.-4½ yd. as Agitators, 1950 model mounted on Ford F6 with Baumis tandem drive.

These units in excellent state of repair. Look like new. Used as agitators. Reason for selling, want larger size Hi-Lo's. Trucks now in operation.

Priced for quick sale at $6000.00 per unit.

READY-MIX CONCRETE CO.
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FORT LAUDERDALE, FLORIDA

CRUSHERS: Gyratory 30", 36", 42", and 48". Nos. 12, 10, 9, 7½, 6, 5 Allis-Chal. and others.
JAW TYPE: 24x36, 25x40, 28x36, 40x48, etc.
CONE TYPE: Symons 2, 3, 4 and 5½'. No. 36 Telsmith. Also Kennedy 19, 25, 37 and 49. Traylor 1'8" and 2'4" TY. Newhouse 7, 10 and 14". Steadman 24, 30 and 36" Impact. Allis-Chalmers Ty. R.
ROLLS: Allis-Chal. 72x30, 54x24, 54x20, 40x15 and 18x16. Pioneer 18x30. Universal 16x24. New Holland 24x16 and 16x16. McLanahan 18x24 and 18x30.
HAMMERMILLS: Williams Nos. 2, 3, 4 and 6. Day Nos. 40 and 70. Gruendler 2XB and 3XB. Dixie 2040, 3650 and 5046, and others.
MILLS: Hardinge 3'x8", 6'x22", 6'x3' and 8'x4'. Kennedy 4x8, 5x6, 5x11, Marcy 4x5, 6x4, 7x16. Raymonds, Sturtevants and others.
CRUSHING PLANTS: 24x36, 25x40, 30x42 and smaller. Also complete stationary plants.
DRYERS: 90"x60', 7'x50', 10'x90', 8'x50'. Etc.
SCREENING PLANT: Large modern plant new in 1946, priced at ⅓ original cost.
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BINS & BATCHERS: 20 yd. capacity & larger.

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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kiln, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. **(I have equipment at many points in the United States and Canada. What you need may be near your plant.)**

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CLASSIFIER—Dorr, Type DSFH.
CONVEYOR—Apron, 34', cc. 36".
CONVEYOR—Belt, 375', cc. 18".
(Other conveyors in stock. Send us your requirements.)
CRUSHER—Jaw, 18" x 36".
CRUSHER—48" Symons Disc.
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MAGNETIC SEPARATOR — 30" three roll.
MILL—Pug, 23" x 12' double shaft, Link Belt.
MIXER—Double Shaft, Paddle, 4' x 20' UNUSED.
SCREEN—Vibrating, 4' x 7' single deck.

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8'x80'x¾" Vulcan.
7'x160'x⅝" (2).
7'x120'x⅝" (2).
7'x60'x⅜" with lifters.
5'x67'x⅝".
5'x30'x⅜" Ruggles-Cole.
4'6"x50'x¼" with lifters.
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4'6"x40'x⅜" Traylor.
4'x35'x½" with burner.

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Complete sand and gravel plant. Capacity 150 to 200 tons of high specification concrete aggregate per hour. Located south of Denver, Colorado. Includes rotary scrubber, several double deck vibrators, sand classifiers, secondary crusher, transformers, motors and controls, many belt conveyors with motors. Also portable primary crushing plant. Also portable screening plant. Scales, shops and pumps.

Priced to move.

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Multiplex 12 cu. ft. Mixer, Tamper & Conveyor, 22—54 Block Racks, 1200—7⅞ x 15⅝—50% Core Pallets. Mould Boxes for 4" and 8" Plains, Rock and Brick Face Block. Multiplex Double hand 5x8x12 and Pallets.

1—7½ HP Motor. 2—5 HP Motors.

1—Truck-Man ½ sack and 1 sack Portable Mixer, rubber tires.

2—Fairfield Electric 20 ft. Conveyors. One Motor Trimmer and one Track Machine.

1—V-8 2 Ton Dump Truck, '46.

1—1½ Ton Wheel Base. Chevrolet Truck.

Owner has other Business Interests.

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Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 8047
Pennsylvania C-4-30 Reversible Hammermill.
Cedar Rapids 4033 Hammermill. Diesel powered.
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36" x 48" Jaw Crusher.
Traylor TY 4' with 200 hp. electric motor.

DREDGES

Ellicott 12"x10" new pump with new V-12 385 HP Diesel engine. Port. steel hull.
Ellicott 8" with cutter. Diesel Hull 48'x18'x3'6".
8" Hydraulic. Diesel. On 32'x8' steel pontoons.
Amsco 10" Diesel power portable. Excellent.
6" portable Diesel complete with cutters, etc.
8" H-P twin Diesel drive. Complete.
Port. Erie Strayer concrete plant 30-40 TPH

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3 Koehring 4 yd. tilting mixers complete.
Smith 56-S two yard tilting mixer. Complete.
Erie 3 compt. 100 ton agg. bin 400 bbl. cement.
B-K 800 bbl. cement, 105 tons 3 compt. aggregate. 400 bbl. reserve silo. New 1950. Excellent.
Large plant 2½ yd 6 compts. agg. & cement elevators. 56-S Mixer.
Large plant 400 yds 5 compt. 2-56S Mixers.
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Cedar Rapids Portable Super Tandem, excellent.
Pioneer 40-V. New 1948. Portable. Diesel power
Pioneer WA 300, crushing, washing, screening.
Pioneer Portable Plant with 24 x 36 jaw primary and 40 x 22 triple roll secondary. New, 1950.
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾".

CRUSHERS

JAW: Acme 10x20, 14x36, 14x28, 10x42, 16x32, 18x32, 25x40, Eagle 20x36, Diamond 24x36".
Cedar Rapids 10x20, 20x36, 25x40, Farrell 10x20, 13x30, 14x36, 18x36, 36x48, Buchanan 36x42.
Good Roads Reliance 15x30, Traylor 18x36, 24x36.
Allis-Chalmers 30x18. Good Roads 10x30, Telsmith 18x32, Champion 1020, 1040, 1236, 1530.
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 28", 30", 42", 14", Newhouse, 24", 36", Gyrasphere, 18", 28". Intercone Telsmith, Telsmith 5H, 10-B, 13-B, 16-B. Kennedy Van Saun 7, 19, 25½-8, 37. Traylor Ty 1'8". Ty 2'4", T-4½".
ROLL: Allis-Chalmers 54x24. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18". New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x33, Jeffrey 36x42, Jeffrey 36x24, 36x40, Dixie 3650.
BALL MILL: Hardinge 10'x48". K.V.S. 6'x8' Type M Air swept J-H 6'x8', Hardinge Conical 6'x22" Colorado Iron Works 5'x6'; Marcy No. 64½. Hardinge conical 10'x36".
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CONE: Symons 2' coarse bowl, 3' standard head.
TUBE MILL: Smidth 5½x29, K.V.S. 4'x7', Traylor 5'x22'.
DRIERS: Struthers-Wells 7'x64'; others 7'x20', 6'x80', 7'x70', 6'x40' and Cedar Rapids 60"x24'.

SHOVELS—CRANES—DRAGLINES

N-W 80-D 2½ yd. Dragline. Diesel. 100' boom.
N-W Model 6, 1½ yd. Diesel Shovel.
Lima Mod. 34, 1 yd. Shovel-Crane-Dragline. Gas.
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Link Belt K-500 Shovel, 1948—practically new.
Bay City Model 650, 1¼ yd. shovel, diesel. Rebuilt.
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Lima 1201, 2½ yd. Diesel Shovel.
Lorain L80 Shovel, 1⅝ yd. complete overhaul.
Link Belt K-505 dragline, 2½ yd., 8 ft. boom.
Lima 802, Shovel-Crane-Drag, 2 yd. Diesel.
Koehring 304 Diesel Shovel, ¾ yd.

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Kennedy Van Saun 5' x 10' double deck.
Diamond 4' x 10', three deck.
Kennedy Van Saun 4' x 10', four deck.
Simplicity 5' x 12', double deck.
Seco double deck 4'x14'.
A-C 5'x14' double deck Riple-Flo screen
Symons 4'x14' double deck
A-C 5'x14' 2 deck riple-flo.

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2 Cat. D8 Angledozers with DDPCU rebuilt.
Int. TD-18A with R-E Bulldozer.
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Al-Chal HD19 Angledozer, Hydraulic.
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Allis Chal. HD-19 with hydraulic control angledozer.
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45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
12 ton Plymouth gas loco. std. ga.
8 ton Plymouth gas loco. std. ga.
25 ton Vulcan steam std. ga. Side tank.
15 ton Whitcomb 36" ga. gas.
12 ton Whitcomb 36" ga. gas.

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American Torry 20 ton Guy Derrick 100' bm.
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American 25 ton stiff leg derrick 90' boom.
Special 35 ton stiff leg derrick 100' boom.
Nat'l. Bridge 30 ton Guy Derrick 100 ft.
American 30 ton stiff leg 100' boom.

ASPHALT PLANTS

Butler 100 yd. Bitu. Concrete plant.
Cedarapids 60"x24' asphalt plant drier. Compl.
Madsen 4000# complete plant Diesel powered.
Model S-100 Simplicity. Diesel powered.
Hetherington-Berner Moto-Paver
McCarter complete plant 3000# capacity.
Cedar Rapids Model PA portable plant.
Cummer Semi-Port. 1500#.
Cedar Rapids Travel Roadmix Plant.

CABLEWAYS

Sauerman slack line 1½ yd.; electric 90' mast.
Sauerman 1 yd. with 100 hp. electric motor, complete.
Sauerman 1 yd. with Waukesha gas hoist.

RICHARD P. WALSH CO.
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COMPLETE, MODERN LIMESTONE CRUSHING PLANT WITH ALL ALLIED EQUIPMENT. NOW OPERATING IN QUARRY IN MIDWEST WITH 150,000 TONS OF WORK FOR 1953. FOR SALE BY OWNER OF LIMESTONE LEASE. WILL GRANT USUAL TERMS TO RESPONSIBLE PARTY. PLEASE GIVE FULL INFORMATION IN FIRST LETTER TO BE HELD IN STRICT CONFIDENCE.

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KOEHRING DUMPTORS. WD60. GMC. Diesel. Current model. Very good. $4250.00 each.

LIMA 802 Diesel Dragline ser. 2436. Rebuilt. Guaranteed. 70 ft. boom with 3 cu. yd. dragline bucket. $26,000.00. Rent $2000.00 apply purchase price.

PIONEER 24" x 36" RB. Portable Primary Plant. Cat. Diesel. Apron Feeder. Undercon-veyor. Tandem trailer. Crusher rebuilt by factory, same as new. $17,500.00.
Also secondary portables hammermill or double rolls.

PIONEER 15" x 36" PB. Jaw Crusher. Good. $1500.00.

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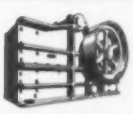

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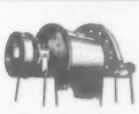

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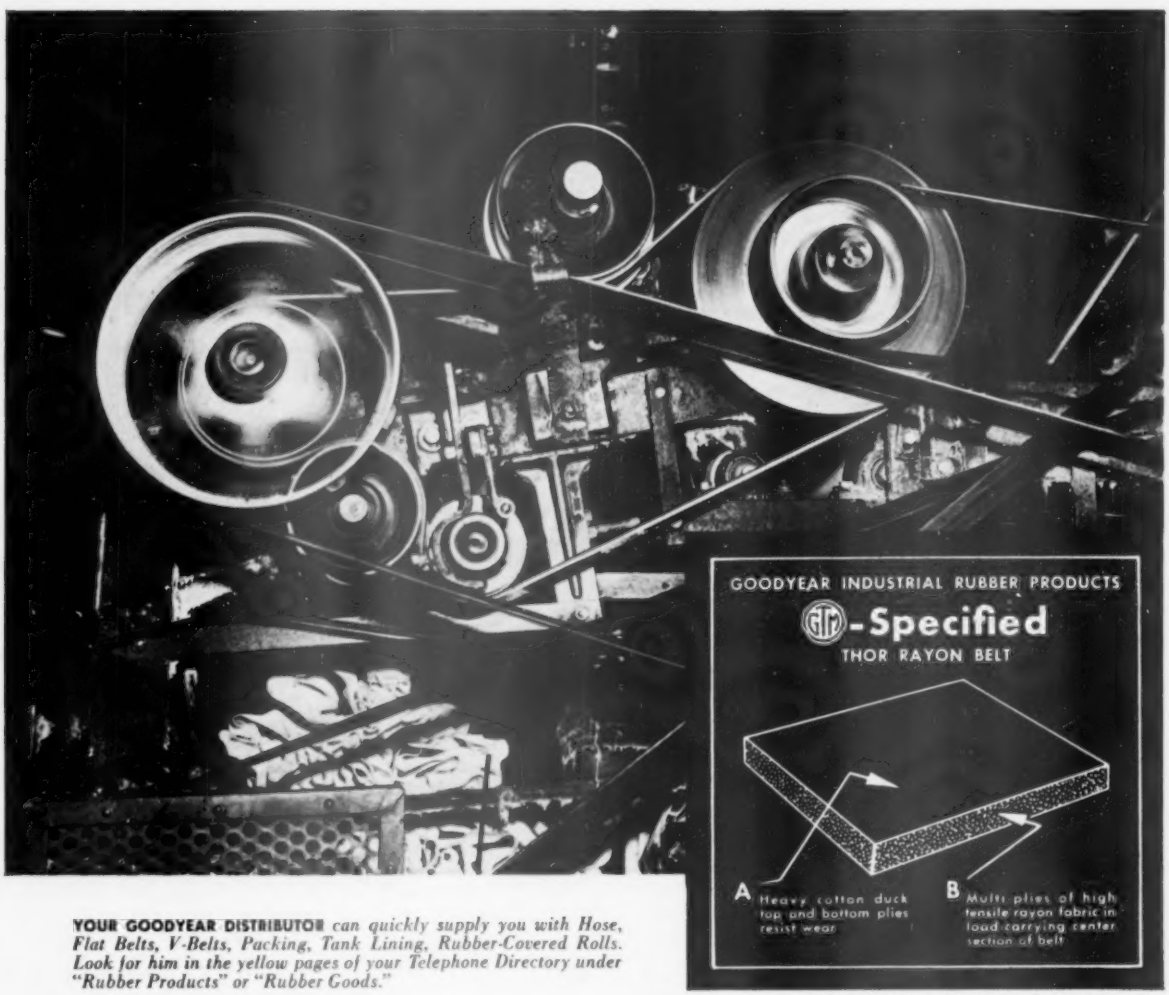
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